Top mass with d_{Merge} cuts - influence of Fisher cutting?

And some follow-ups...

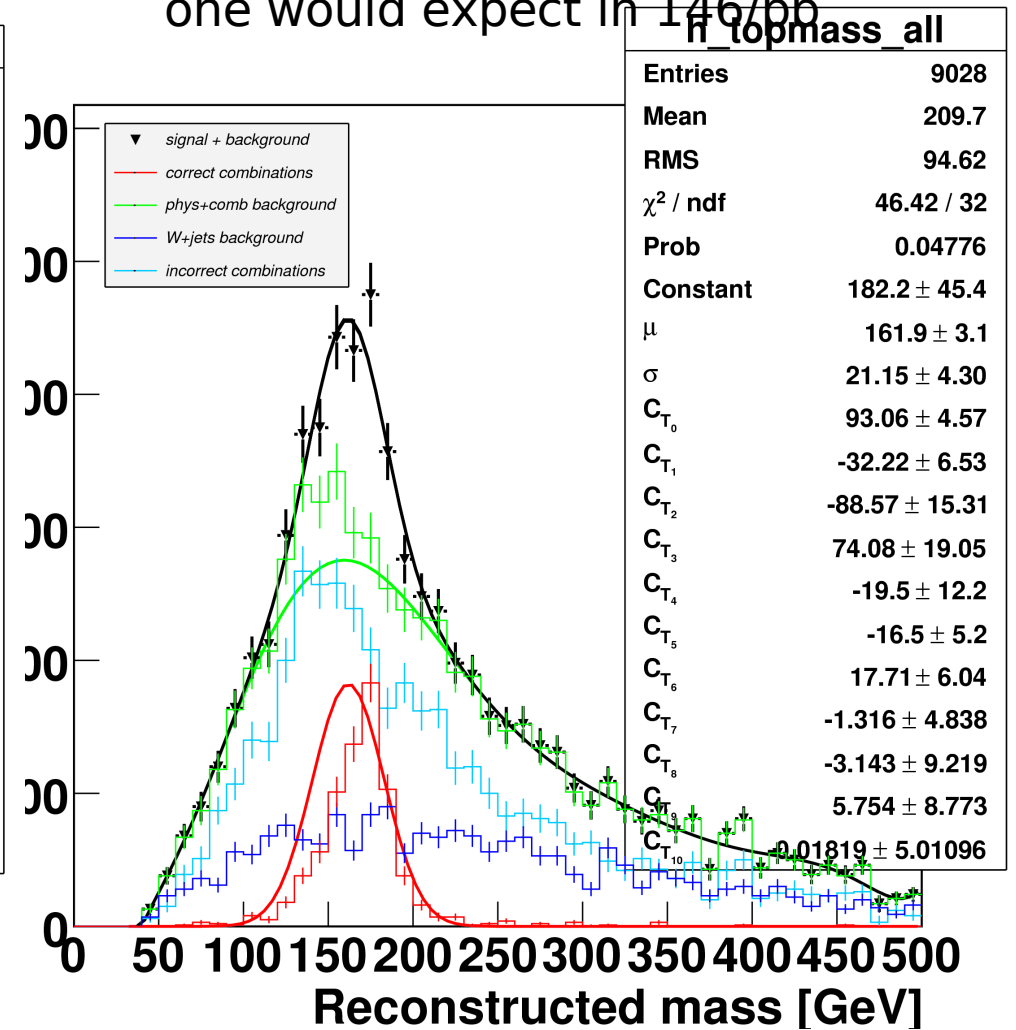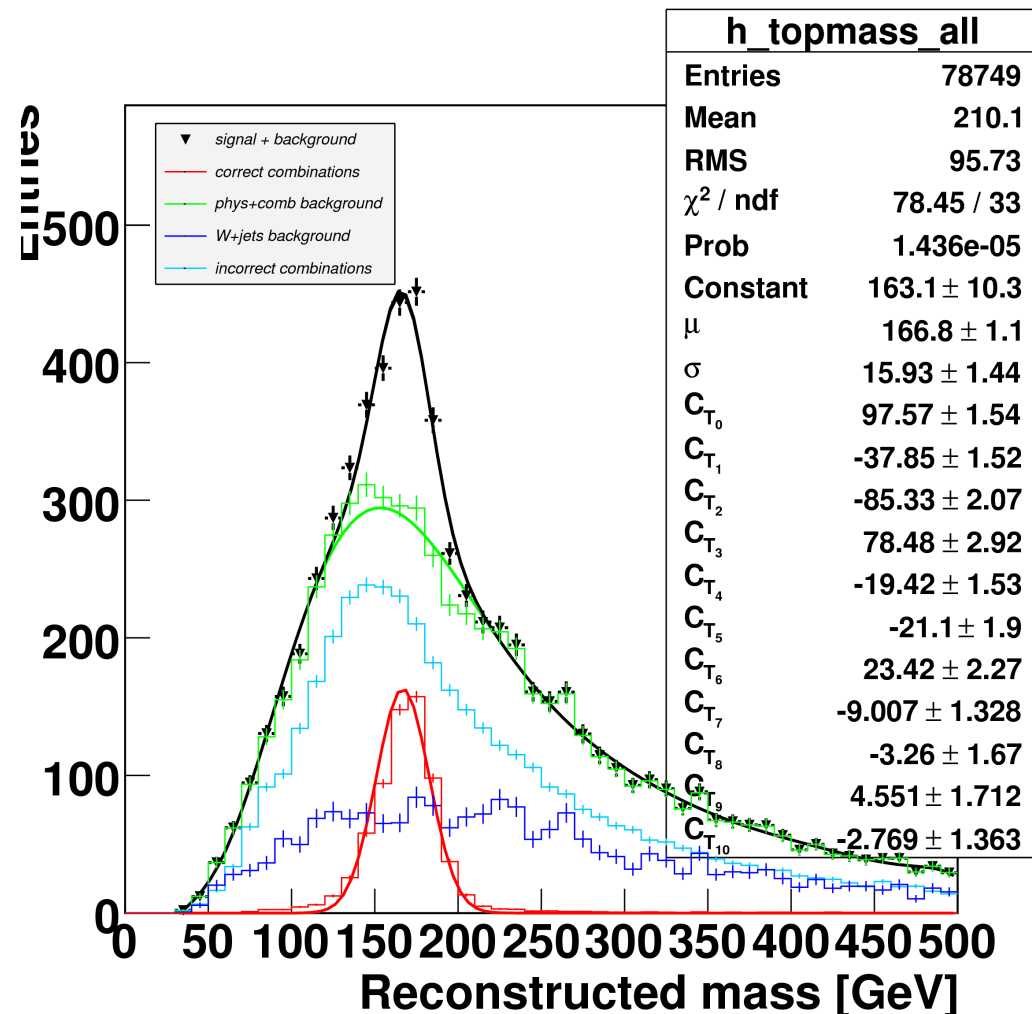top group meeting
5. March 2009

Max-Planck-Institut für Physik
(Werner-Heisenberg-Institut)
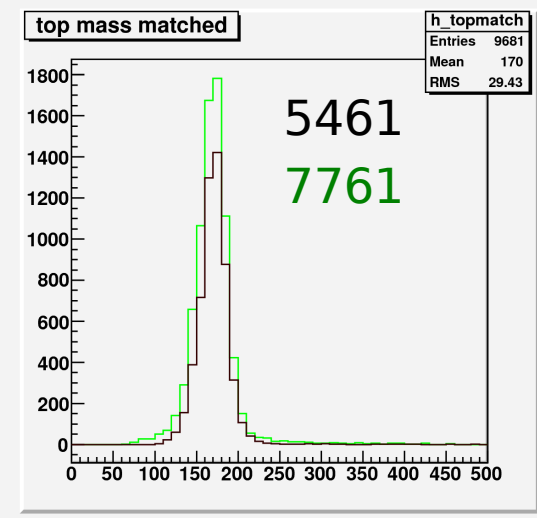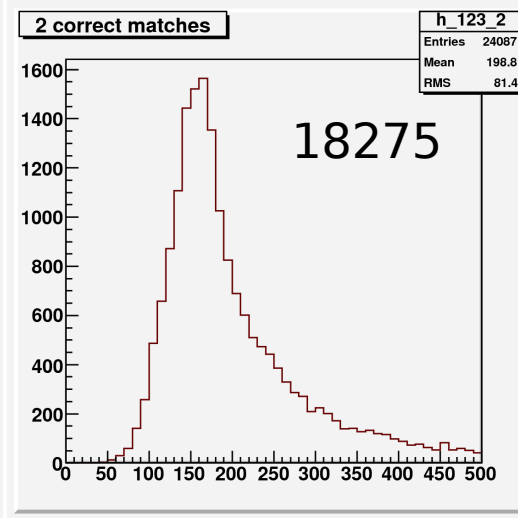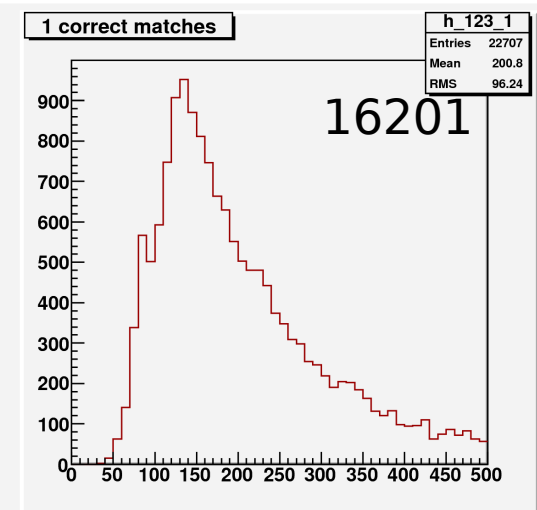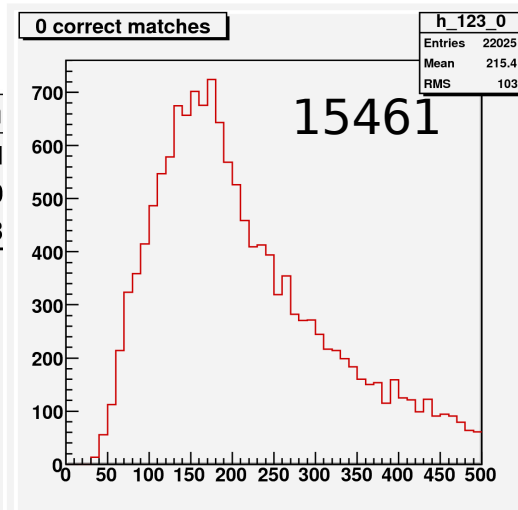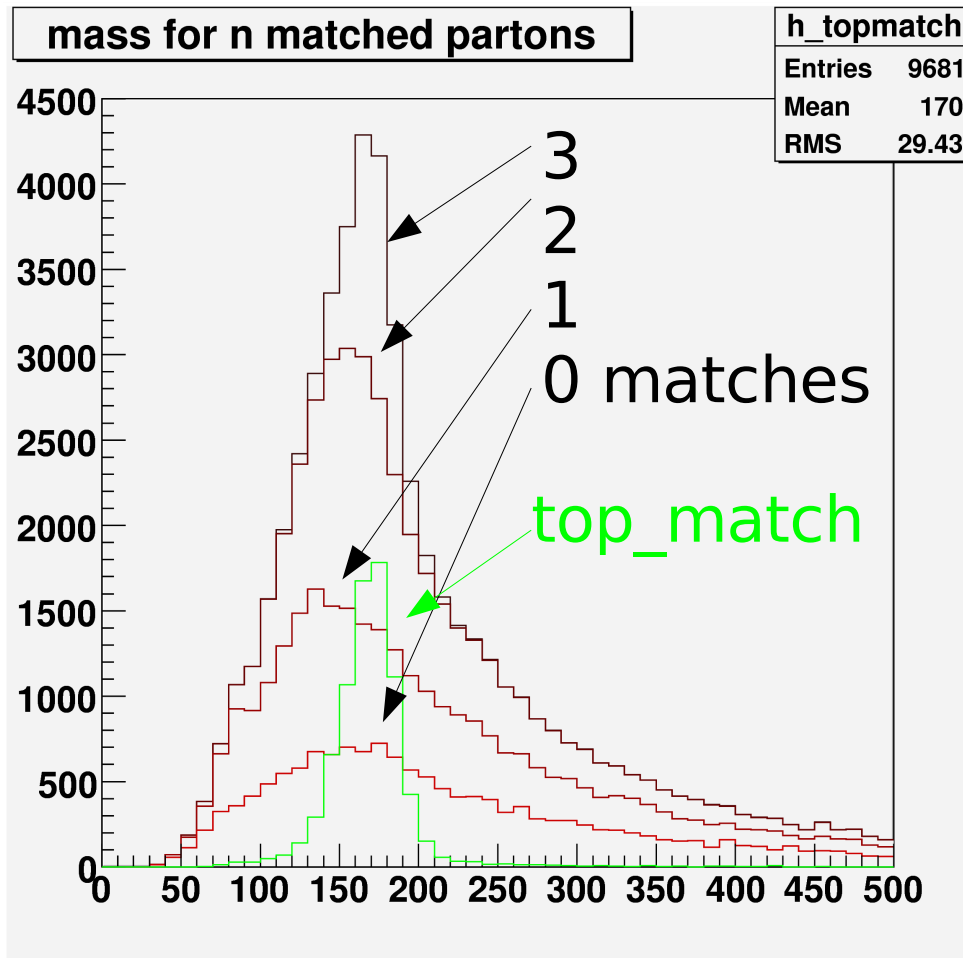
Top mass plots with correct errors

Full statistics
this time with correct errors

events in 146/pb
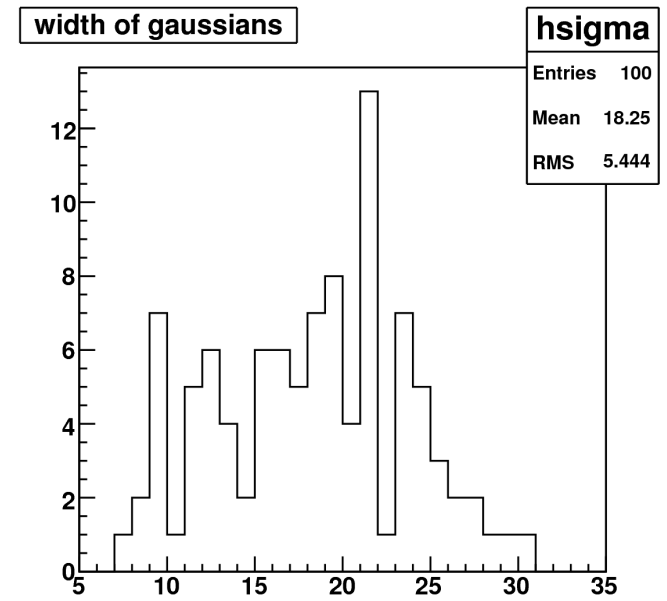for each sample pick the number of events that one would expect in 146/pb

h_topmass_all	
Entries	78749
Mean	210.1
RMS	95.73
χ^2 / ndf	78.45 / 33
Prob	1.436e-05
Constant	163.1 ± 10.3
μ	166.8 ± 1.1
σ	15.93 ± 1.44
C_{T_0}	97.57 ± 1.54
C_{T_1}	-37.85 ± 1.52
C_{T_2}	-85.33 ± 2.07
C_{T_3}	78.48 ± 2.92
C_{T_4}	-19.42 ± 1.53
C_{T_5}	-21.1 ± 1.9
C_{T_6}	23.42 ± 2.27
C_{T_7}	-9.007 ± 1.328
C_{T_8}	-3.26 ± 1.67
C_{T_9}	4.551 ± 1.712
$C_{T_{10}}$	-2.769 ± 1.363

h_topmass_all	
Entries	9028
Mean	209.7
RMS	94.62
χ^2 / ndf	46.42 / 32
Prob	0.04776
Constant	182.2 ± 45.4
μ	161.9 ± 3.1
σ	21.15 ± 4.30
C_{T_0}	93.06 ± 4.57
C_{T_1}	-32.22 ± 6.53
C_{T_2}	-88.57 ± 15.31
C_{T_3}	74.08 ± 19.05
C_{T_4}	-19.5 ± 12.2
C_{T_5}	-16.5 ± 5.2
C_{T_6}	17.71 ± 6.04
C_{T_7}	-1.316 ± 4.838
C_{T_8}	-3.143 ± 9.219
C_{T_9}	5.754 ± 8.773
$C_{T_{10}}$	0.01819 ± 5.01096

Legend (both plots):
- signal + background
- correct combinations
- phys+comb background
- W+jets background
- incorrect combinations
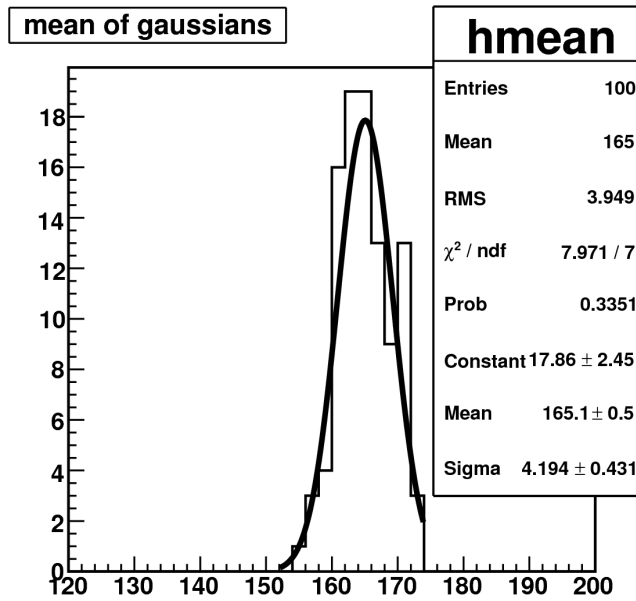
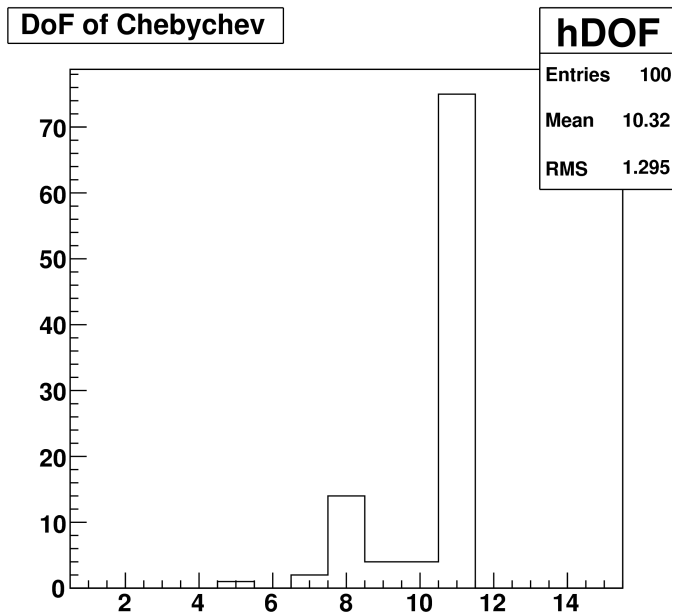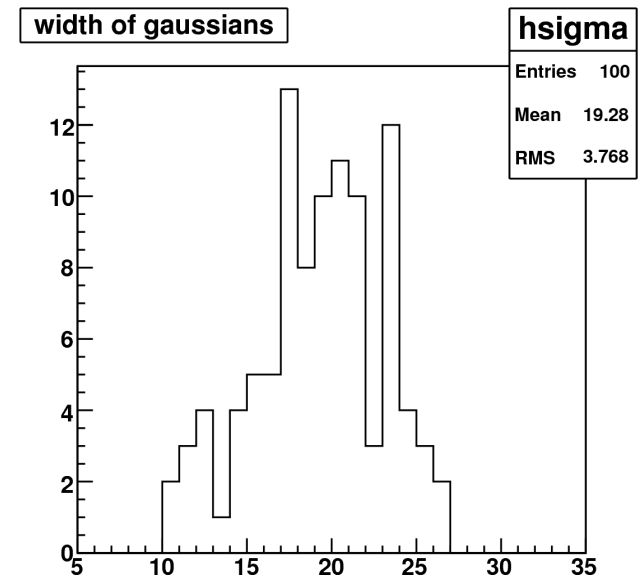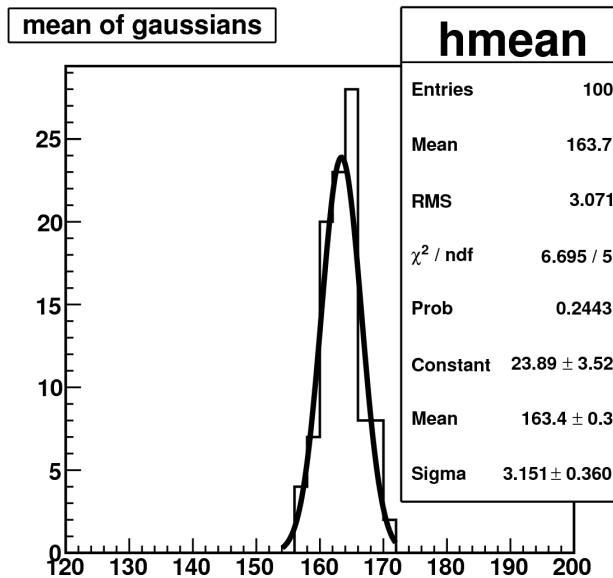X-axis: **Reconstructed mass [GeV]**
Y-axis: **Entries**

p$_T$^{max} top matching

Top masses of the highest-pt combination, split by number of jet-parton matches (signal only)

Chebychev fitting – ensemble test

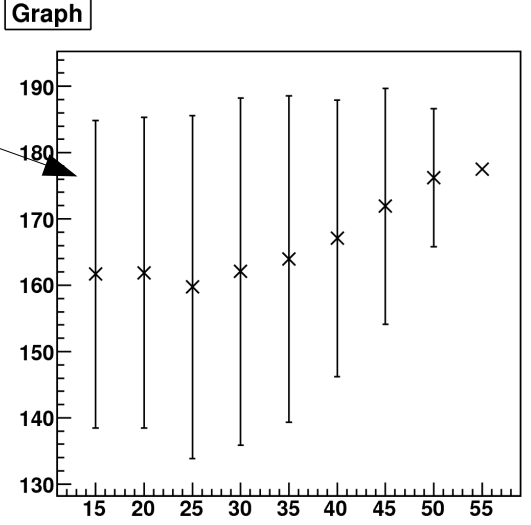- Picking 100x events in 146/pb and fitting S+B
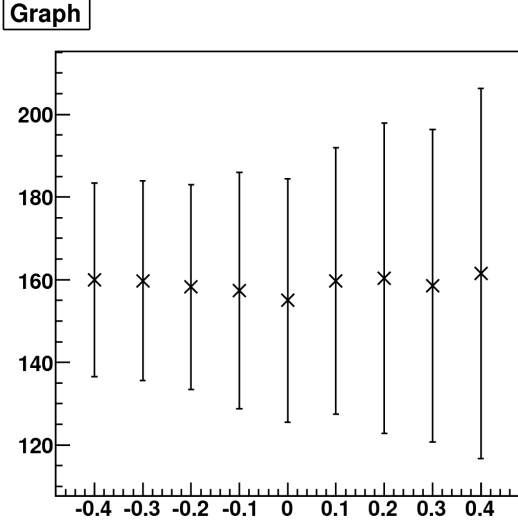- 8DoF and free nDoF

mean of gaussians

hmean	
Entries	100
Mean	163.7
RMS	3.071
χ^2 / ndf	6.695 / 5
Prob	0.2443
Constant	23.89 ± 3.52
Mean	163.4 ± 0.3
Sigma	3.151 ± 0.360

width of gaussians

hsigma	
Entries	100
Mean	19.28
RMS	3.768

DoF of Chebychev

hDOF	
Entries	100
Mean	10.32
RMS	1.295

mean of gaussians

hmean	
Entries	100
Mean	165
RMS	3.949
χ^2 / ndf	7.971 / 7
Prob	0.3351
Constant	17.86 ± 2.45
Mean	165.1 ± 0.5
Sigma	4.194 ± 0.431

width of gaussians

hsigma	
Entries	100
Mean	18.25
RMS	5.444

Stability of mass when cutting

Cutting on dMerge(5->4)

Cutting on Fisher output
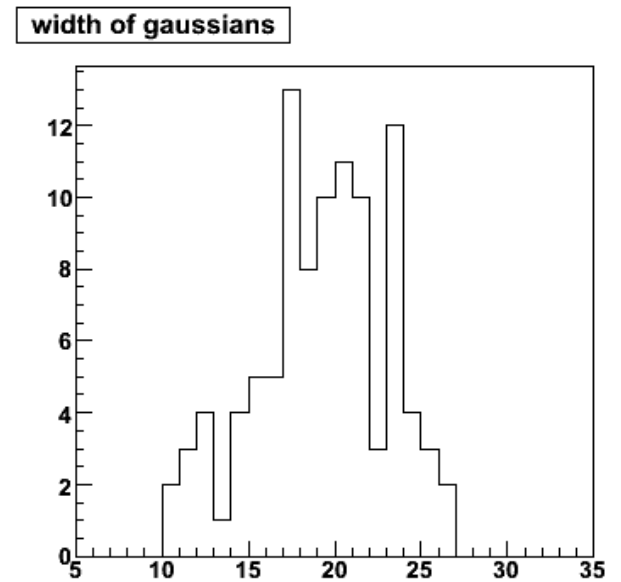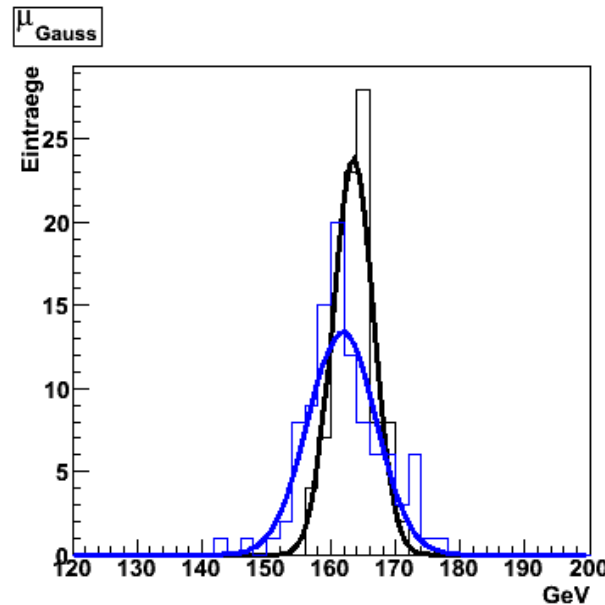
Correlated errors

Mean and width of Gauss fit to „data"

Mean and RMS of top_match

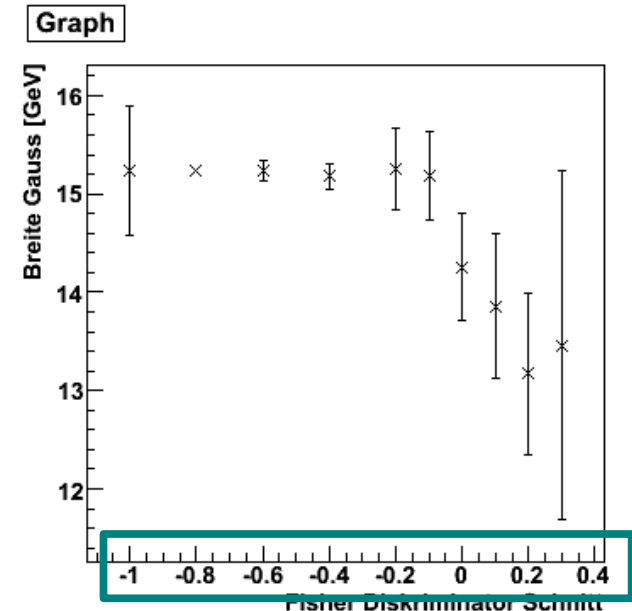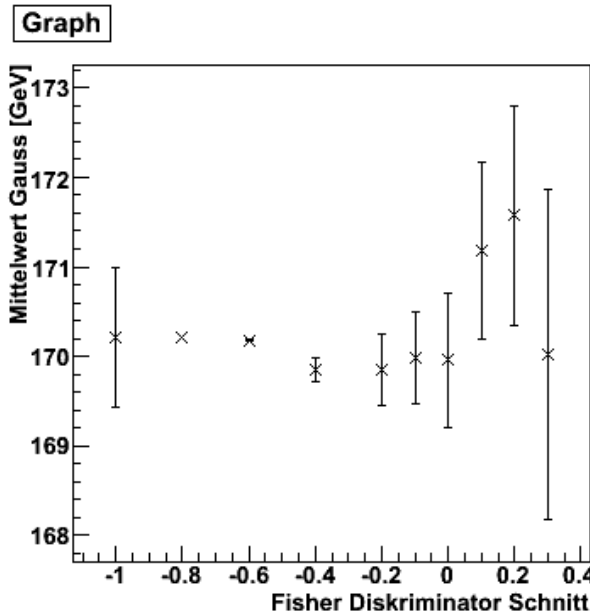# Stability of mass when cutting

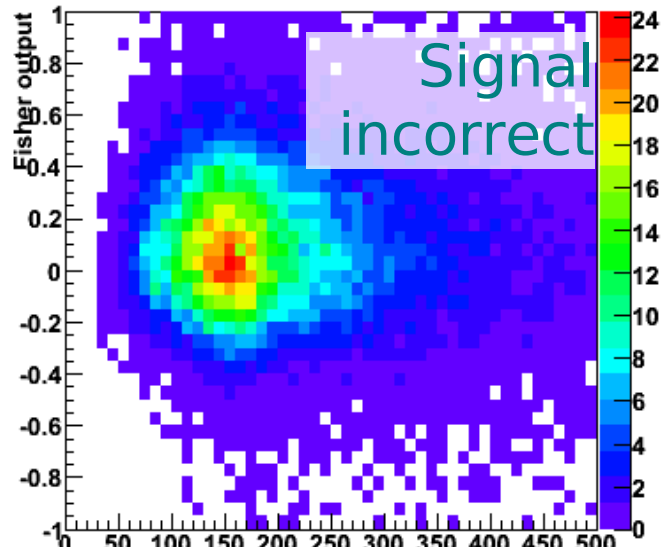Mean and sigma of „data" fit, ensemble of 2x100 fits, with and w/o Fisher cut

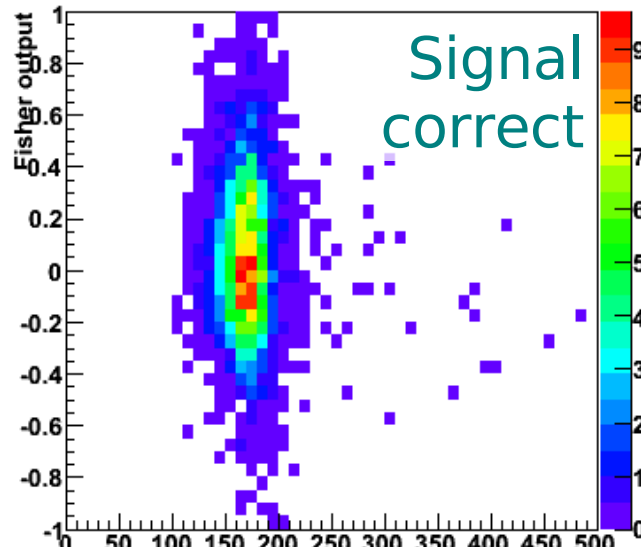Mean and sigma of Gauss fit to correct combinations when scanning Fisher cut. Errors are the decorrelated fit errors

$$\sigma^2_{decorrelated} = |\sigma^2 - \sigma^2_0|$$
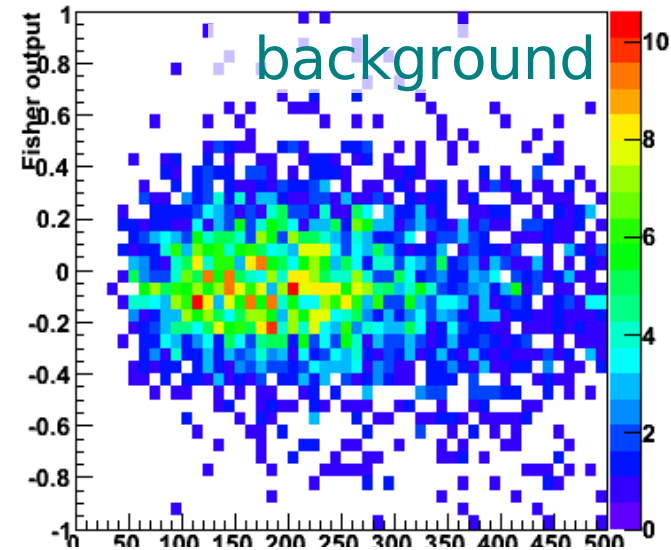
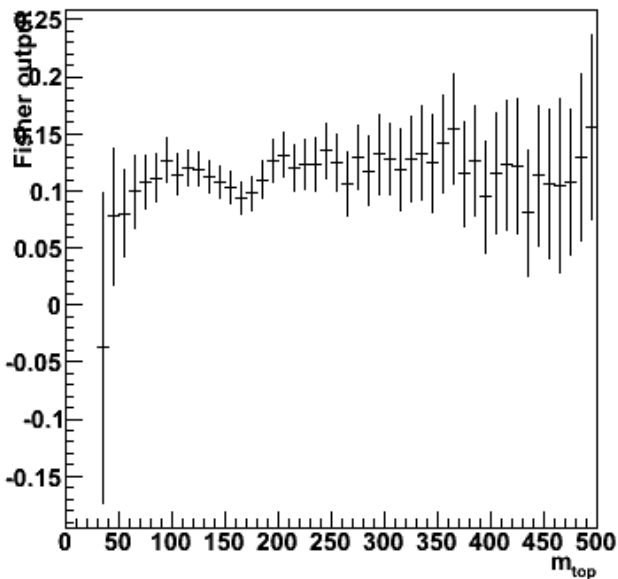# Mass vs Fisher output - event-by-event

Mass vs. Fisher output - event-by-event

- Same plot as last slide, but with the profile direction on the other axis
- There seems to be no correlation between Fisher output and reconstructed top mass

Backup

Top Selection

Using DPDs with signal and W+jets background (105200 & 108240-108250)

DPD making introduces a soft preselection:

    ≥1 lepton p_T>10GeV, $|\eta|$ <3

    ≥2 jets >20GeV, a third one >10 GeV (Cone4H1Tower)

    No MET cut (HecQ missing)

Standard top reconstruction selection:

    ≥1 lepton >20GeV, $|\eta|$<2.5 (Tight electrons, etcone20<6GeV)

    ≥3 jets >40GeV, a fourth one >20GeV (Kt4LCTopo)

    No MET cut

    HEC veto: no jet >10GeV in broken quadrant

Trying to enhance top fraction by imposing cut on d_{Merge} scales determined by exclusive k_T algorithm running on TopoClusters