k_T running with
electron clusters removed

top group meeting
30. March 2009

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

# Removal of electron clusters

- Issue: electrons make clusters which end up in k_T jet evolution
- First try for a solution:
  - Compare sliding window cluster of selected electrons
    ```
    electronClusters.push_back((*elIter)->cluster());
    ```
  - With topoClusters for k_T
    ```
    AnalysisUtils::Match::R((*clusterIter), &electronClusters, index, deltaRMatch);
    ```
  - Remove TopoClusters within deltaR<0.1 of selected electron clusters and start exclusive k_T from there
- would expect to put electron channel on the same ground as muon and tau channels, allowing for correct „common" cutting
- increases cut and Fisher performance only slightly

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ATLAS

d$_{merge}$ revisited

$$\sqrt{d_M}(5\text{->}4)$$

he		
Entries		25652
Mean		45.39
RMS		16.13

hm		
Entries		36693
Mean		35.26
RMS		16.09

ht		
Entries		4843
Mean		39.06
RMS		15.9

he		
Entries		25652
Mean		34.66
RMS		15.84
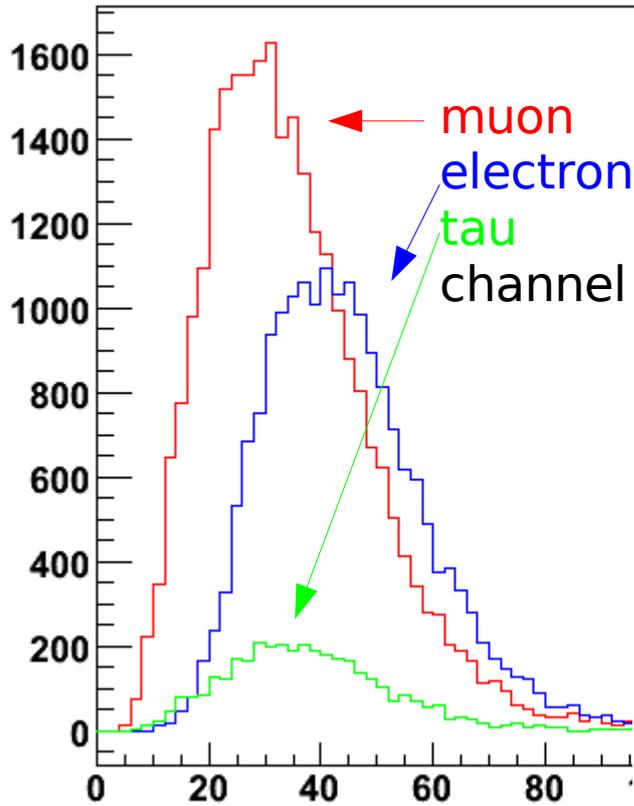
hm		
Entries		36693
Mean		35.25
RMS		16.08

ht		
Entries		4843
Mean		36.41
RMS		16

mu

muon
electron
tau
channel

before
electron removal

after

signal only

$\sqrt{d_M[4]}$ (GeV)
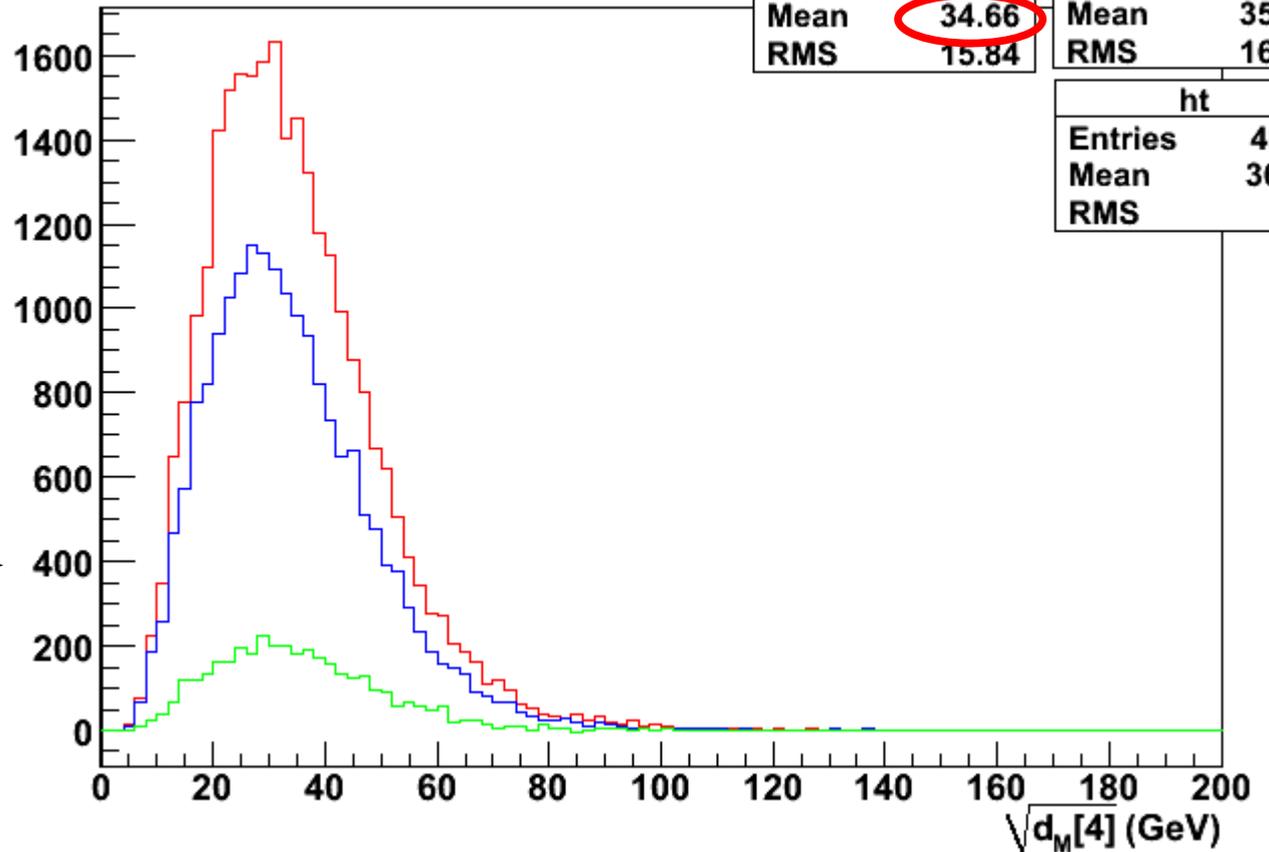
signal & background influence

muon channel

sig	hsig	
	Entries	36693
	Mean	35.26
	RMS	16.09
	hback	
	Entries	1893
	Mean	27.92
	RMS	13.86

signal
background

electron channel

sigel	hsige	
	Entries	25652
	Mean	45.39
	RMS	16.13
	hbacke	
	Entries	1121
	Mean	38
	RMS	15.54

electron channel corrected

gel	hsige	
	Entries	25652
	Mean	34.66
	RMS	15.84
	hbacke	
	Entries	1121
	Mean	26.15
	RMS	12.28
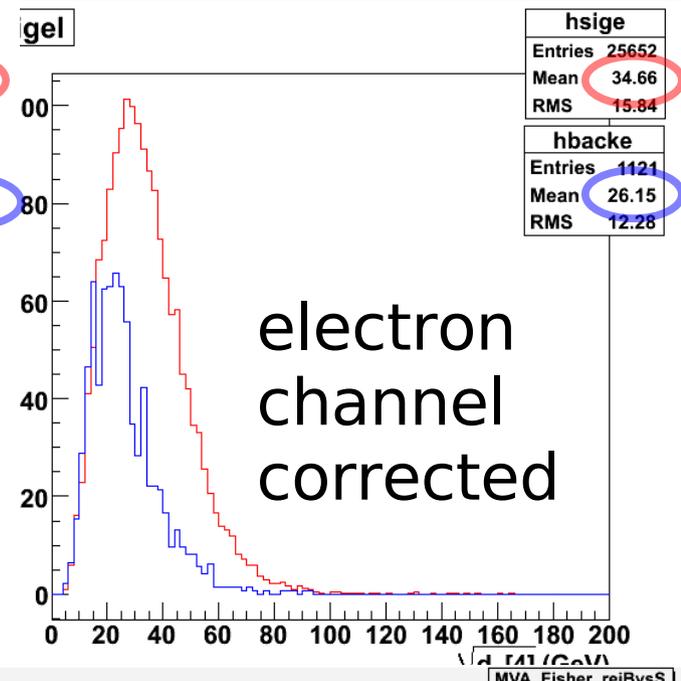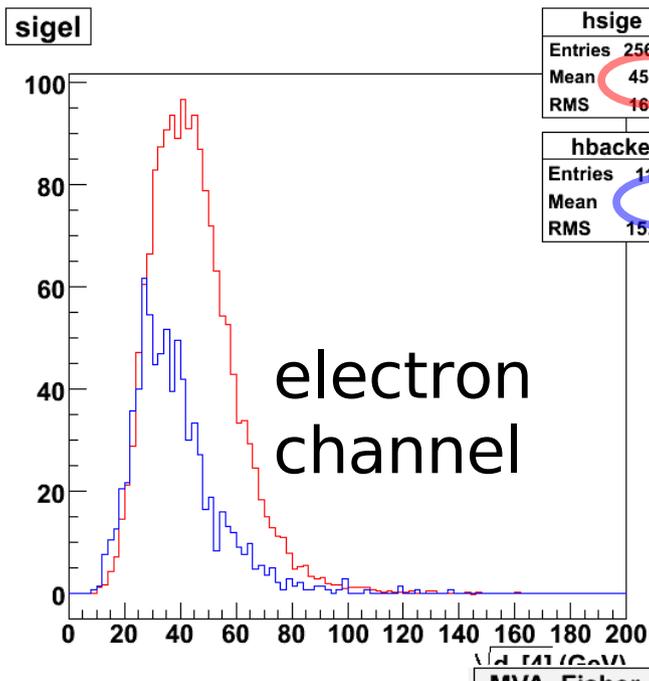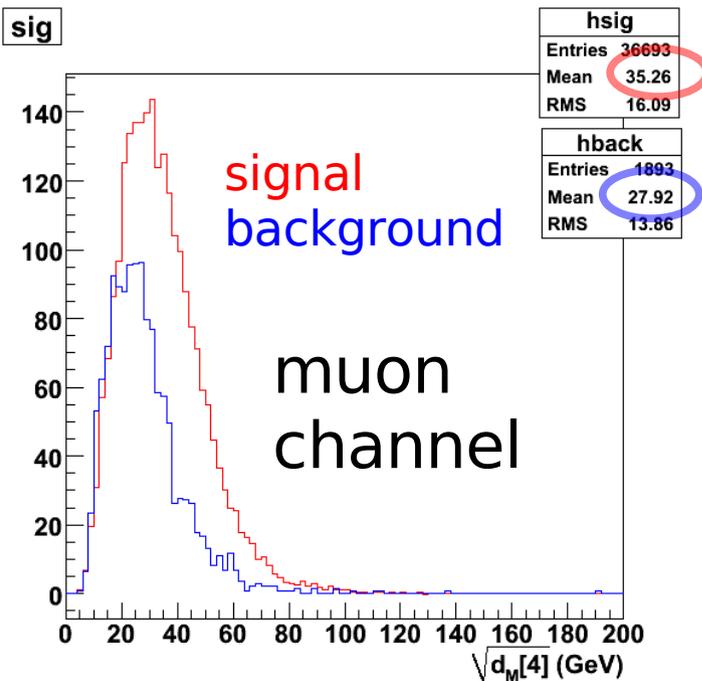
- shift in electron channel is significantly smaller
- performance of Fisher doesn't gain much

| MVA_Fisher		
Entries	100
Mean	0.3895
RMS	0.2529

electron clusters removed

previous
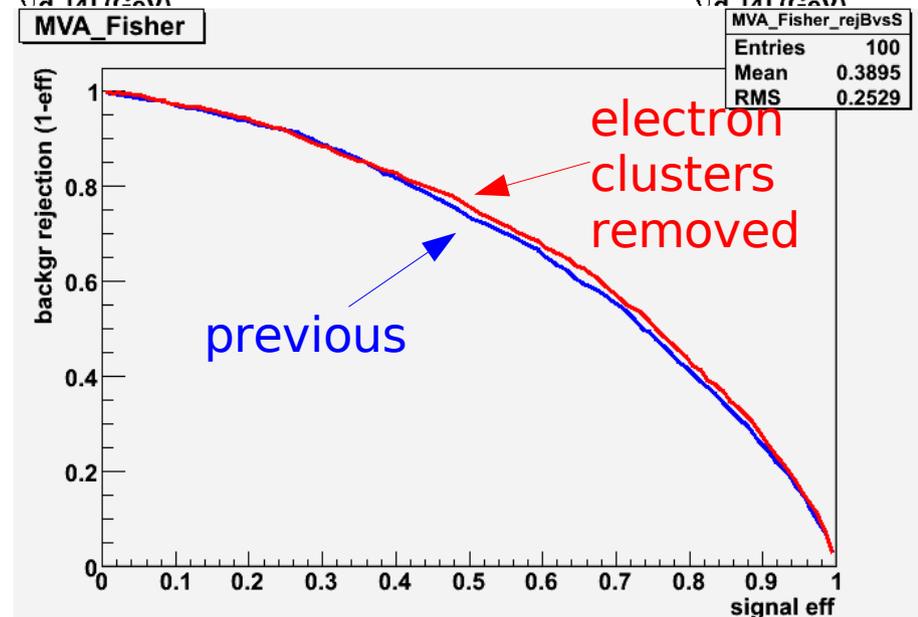
Improvement?

- Integral of ROC curve (~ fill factor) for Fisher increases from 67.66 to 68.79 (1.7% increase)

no elCluster removal
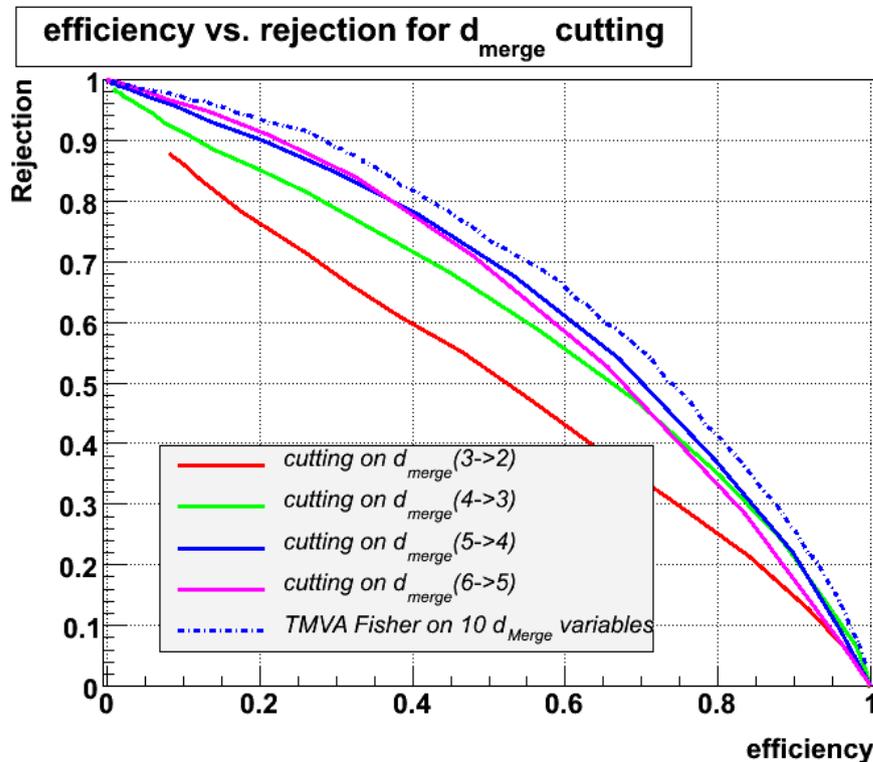
with elCluster removal
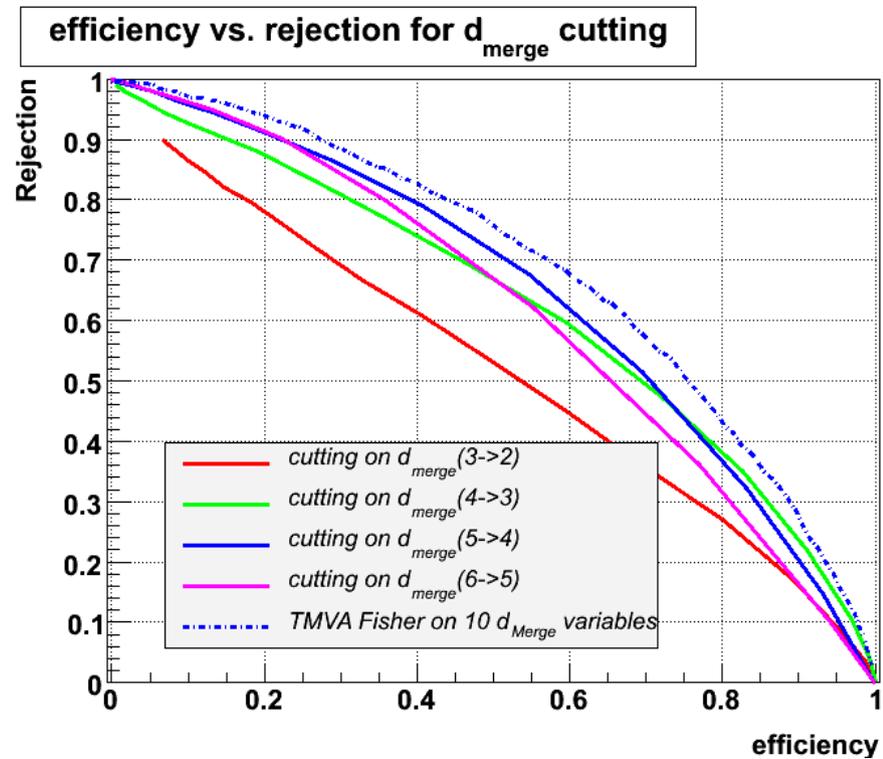
Backup

Top Selection

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

DPD making introduces a soft preselection:

- $\geq$1 lepton p_T>10GeV, $|\eta|$ <3
- $\geq$2 jets >20GeV, a third one >10 GeV (Cone4H1Tower)
- No MET cut (HecQ missing)

Standard top reconstruction selection:

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