LCDRootApps:

- Collection of ROOT library functions by Toshinori Abe and Masako Iwasaki

- Event generation with PandoraPythia

- JetFinder

- Implements the ZVTOP algorithm

Selection of events:

- $H \longrightarrow b\,\bar{b}$
- $E_{cm} = 500$ GeV
- $m_H = 120$ GeV
- unpolarized beams
- Forced into two Jets

Vertex finding with ZVTOP should help identify B candidates

p_t - corrected mass $>$ 2 GeV: B

Problem: A lot of tracks are not assigned to any vertex, therefore we are missing some data !

Goal: If all the tracks are correctly assigned to vertices, the p_t - corrected mass will increase

-> Improve B tagging !

JetFinder:

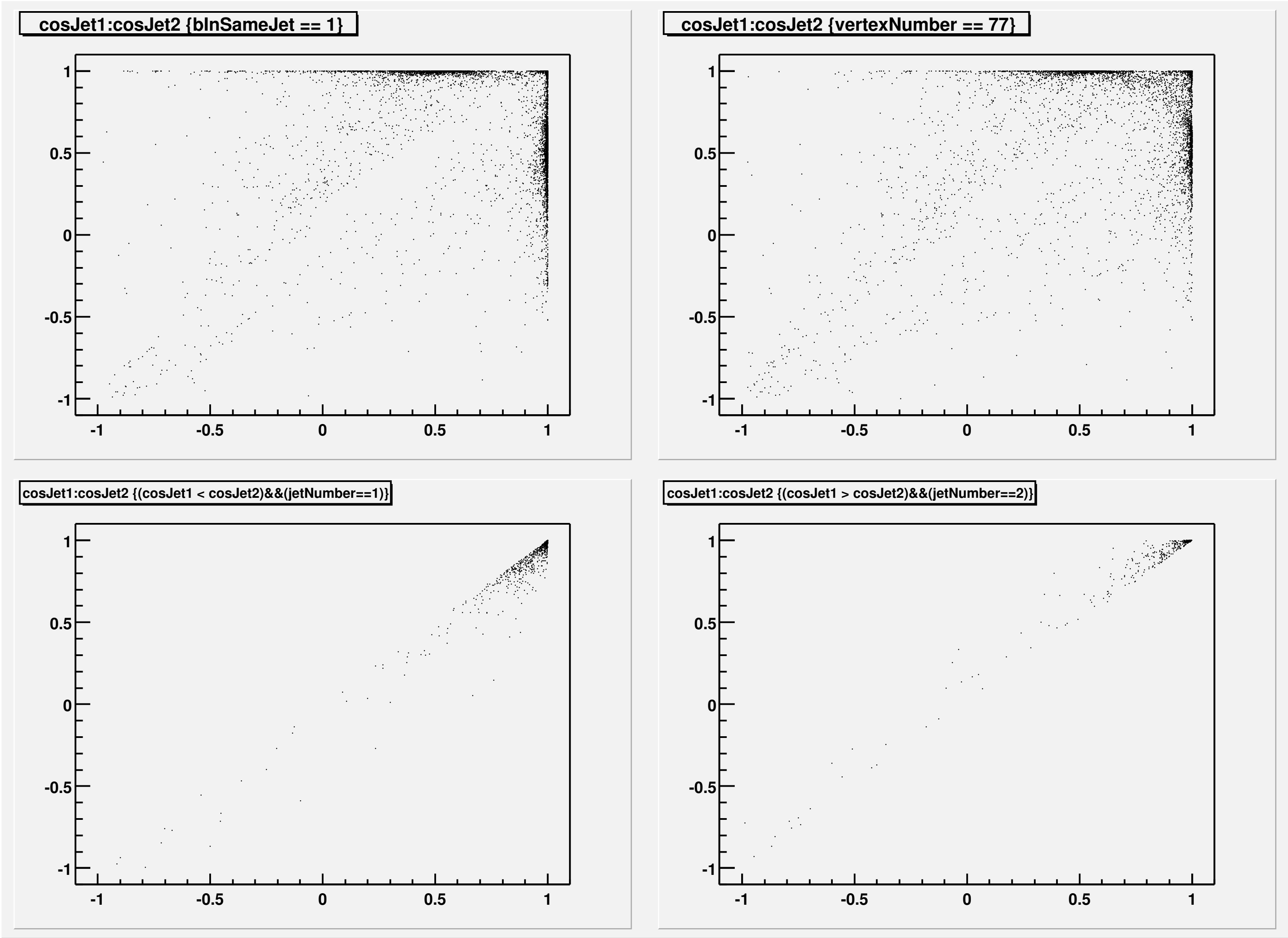
- Doesn't always put the tracks correctly into two jets

- Sometimes a particle makes tracks in two different jets !

Correct Jet assignment is essential for vertex assignment

Number of tracks that were not assigned to any vertex is much higher without JetFinder

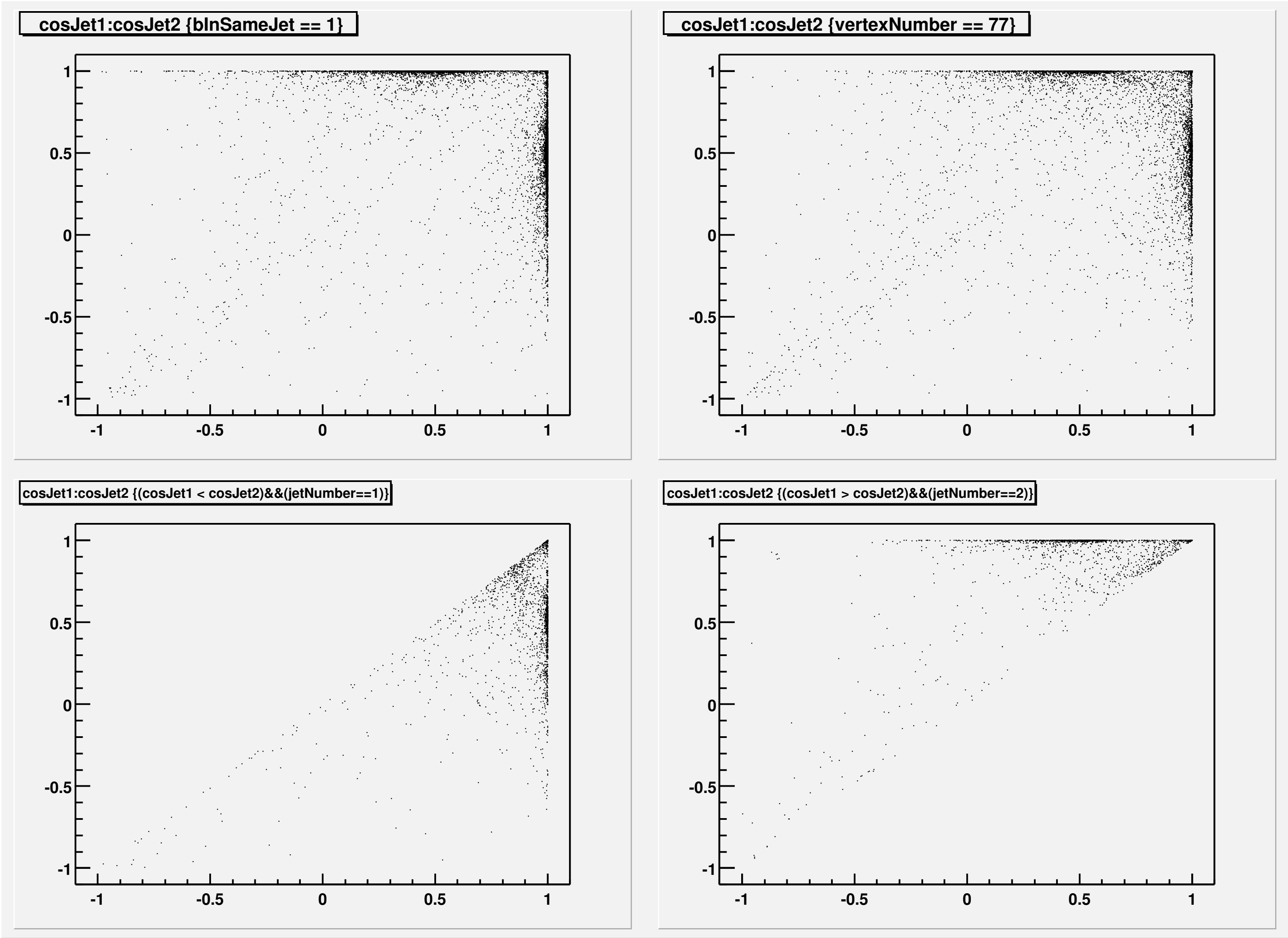
We need every fraction of a GeV !


cosJet1:cosJet2 {bInSameJet == 1}
cosJet1:cosJet2 {vertexNumber == 77}
cosJet1:cosJet2 {(cosJet1 < cosJet2)&&(jetNumber==1)}
cosJet1:cosJet2 {(cosJet1 > cosJet2)&&(jetNumber==2)}
1
0.5
0
-0.5
-1
-1
-0.5
0
0.5
1

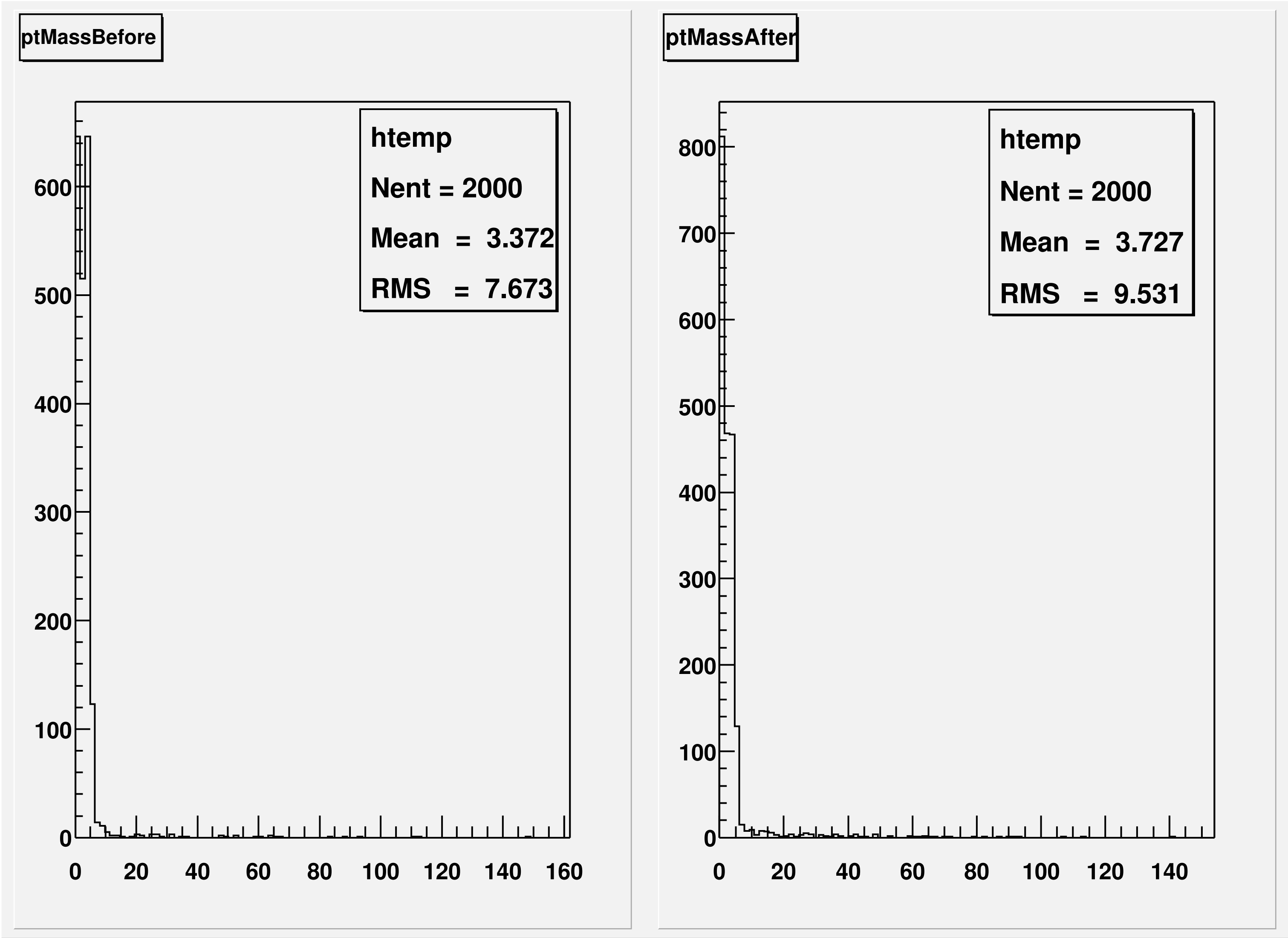
Idea !

Perform first run and assign all tracks with parent in wrong Jet to the other Jet

Perform second run and see what changes:



cosJet1:cosJet2 {bInSameJet == 1}
cosJet1:cosJet2 {vertexNumber == 77}
cosJet1:cosJet2 {(cosJet1 < cosJet2)&&(jetNumber==1)}
cosJet1:cosJet2 {(cosJet1 > cosJet2)&&(jetNumber==2)}


ptMassBefore
htemp
Nent = 2000
Mean = 3.372
RMS = 7.673
0
100
200
300
400
500
600
0
20
40
60
80
100
120
140
160
ptMassAfter
htemp
Nent = 2000
Mean = 3.727
RMS = 9.531
0
100
200
300
400
500
600
700
800
0
20
40
60
80
100
120
140

CHEATING !

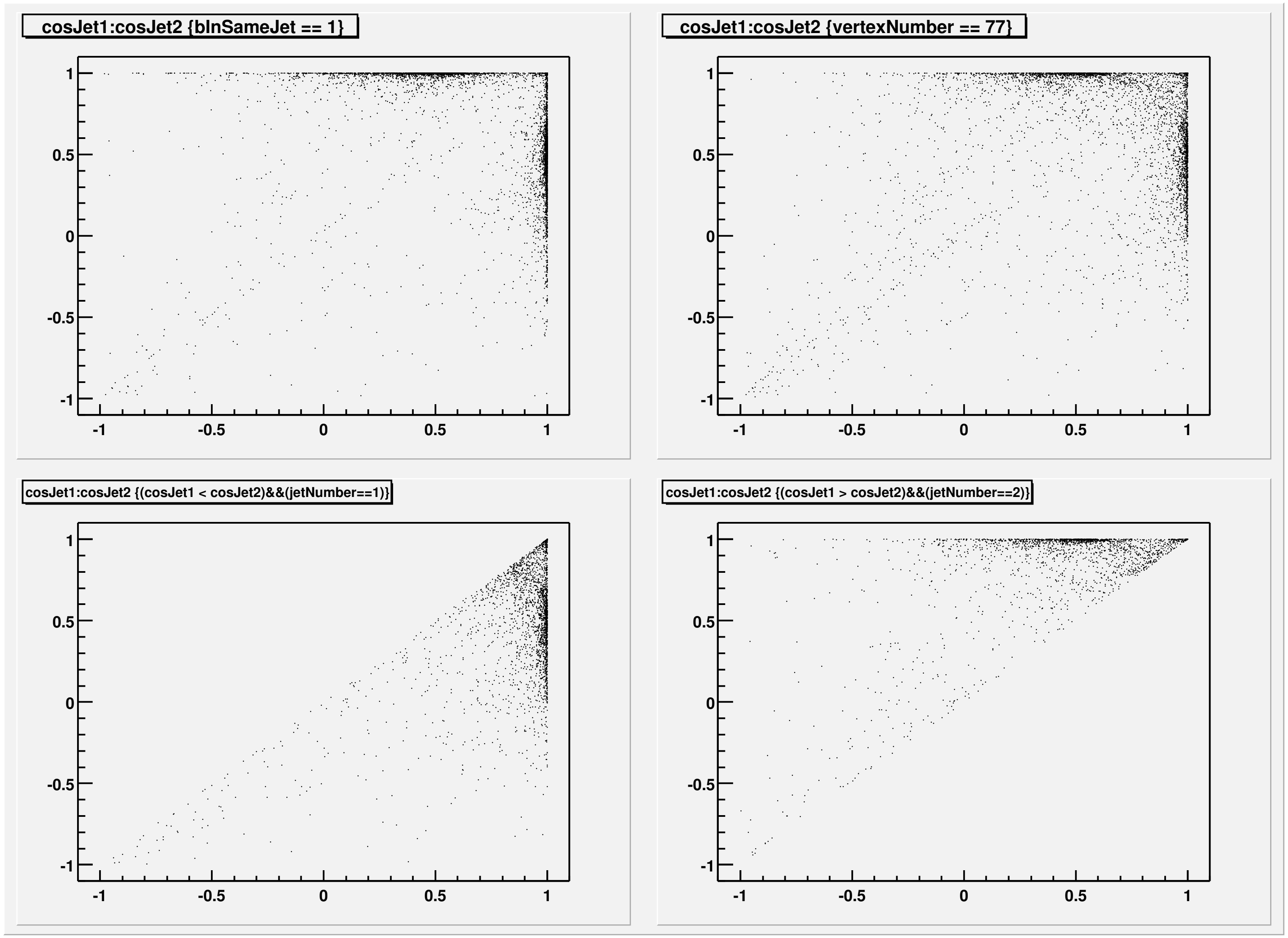
1. Of course we cannot use this information in the experiment

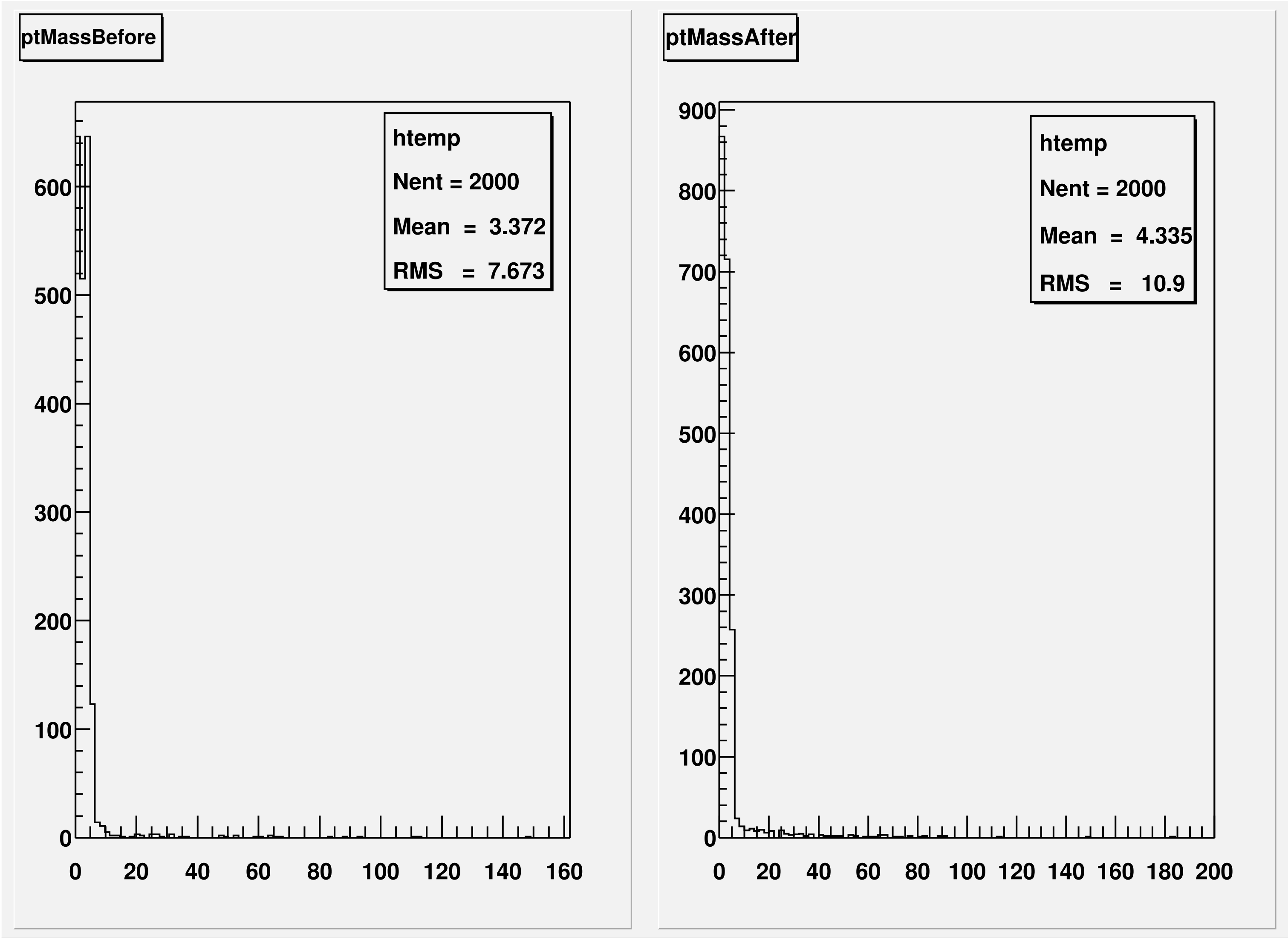
2. Unfortunately, the number of events with a p_t - corrected mass $>$ 2.0 GeV seems to go down !

The second try:

Put all "unverticized" into the other Jet:

- Increased the p_t - corrected mass even more


cosJet1:cosJet2 {bInSameJet == 1}
cosJet1:cosJet2 {vertexNumber == 77}
cosJet1:cosJet2 {(cosJet1 < cosJet2)&&(jetNumber==1)}
cosJet1:cosJet2 {(cosJet1 > cosJet2)&&(jetNumber==2)}
-1
-0.5
0
0.5
1


ptMassBefore
htemp
Nent = 2000
Mean = 3.372
RMS = 7.673
ptMassAfter
htemp
Nent = 2000
Mean = 4.335
RMS = 10.9

On the other hand, didn't help with the *number* of events, either...

Second idea:

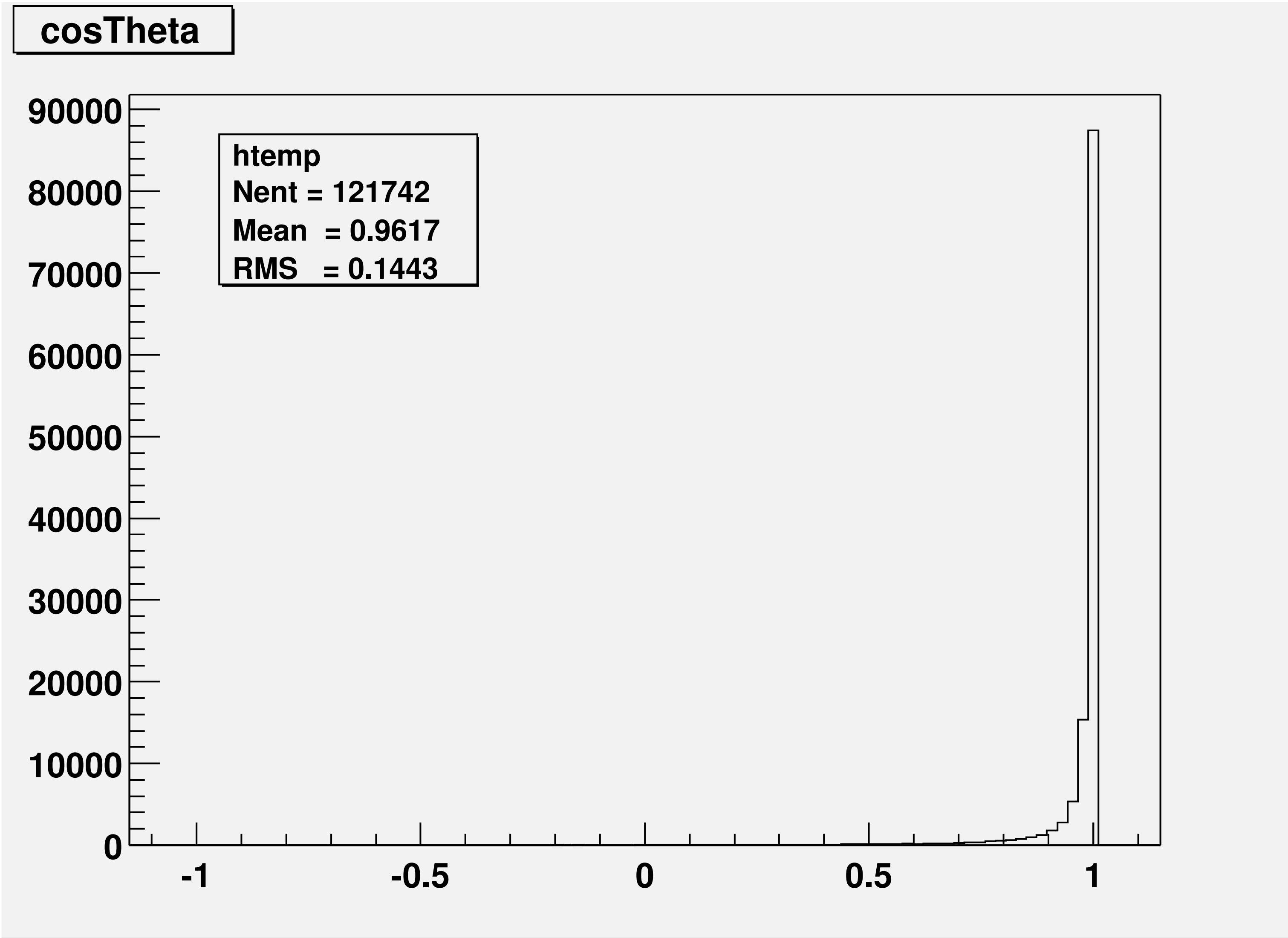
- Gamma rays are totally left out in the vertex detector !
- Adding their energy to the p_t - corrected mass might lift a B candidate over 2 GeV limit

How do we get this information ?

- Use the calorimeter !

How good does it have to be ?

(We need at least all gammas from a B)


cosTheta
htemp
Nent = 121742
Mean = 0.9617
RMS = 0.1443
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
-1
-0.5
0
0.5
1

TO DO List:

- Improve JetFinder with information from the first run of the Vertex Finder

->Find a sensible combination of (measurable) properties to increase number of vertices with

a p_t - corrected mass $>$ 2.0 GeV

- Improve Vertex finding even more

- Incorporate information about the gamma rays from the calorimeter into the p_t - corrected mass