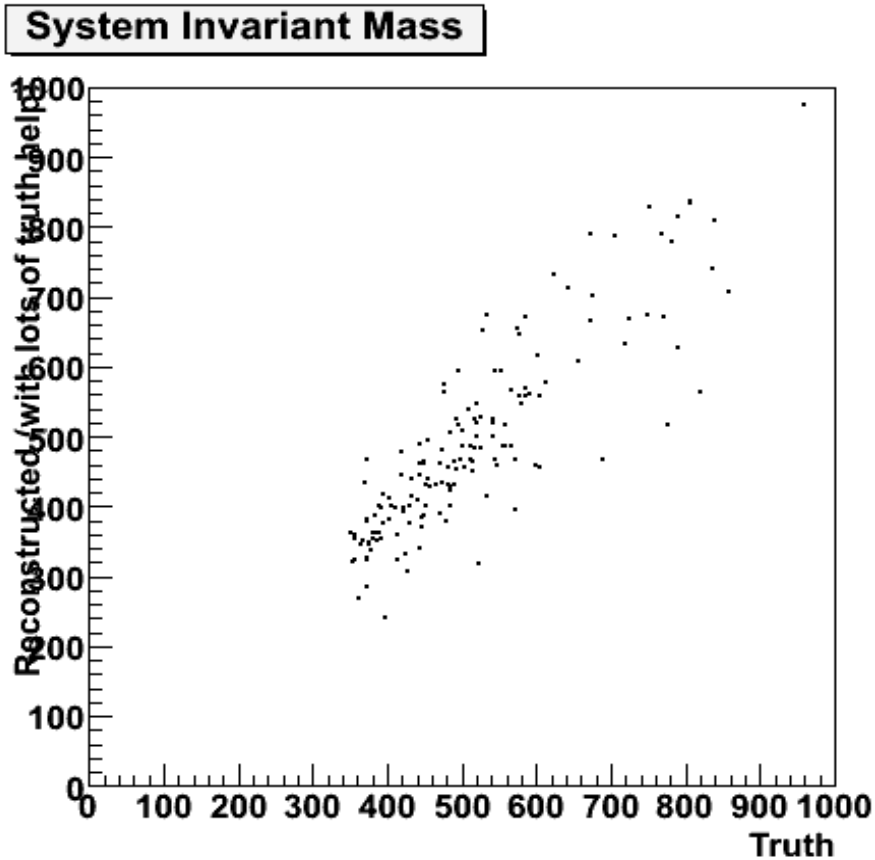
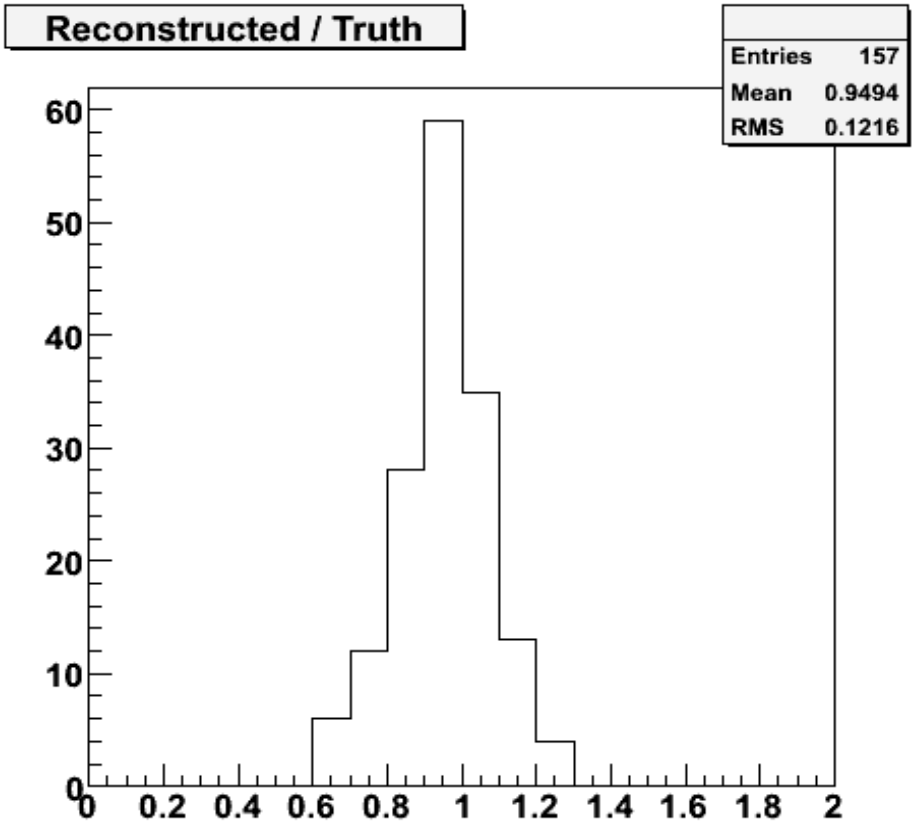
First (below) I use lots of truth help to make sense of all the combinatorical choices, and then see how well things work with progressively less peaking.

starting from 2,583 events
electron + jets channel: 656
all 5 visible things matched: 224
sensible ϑpz result: 157

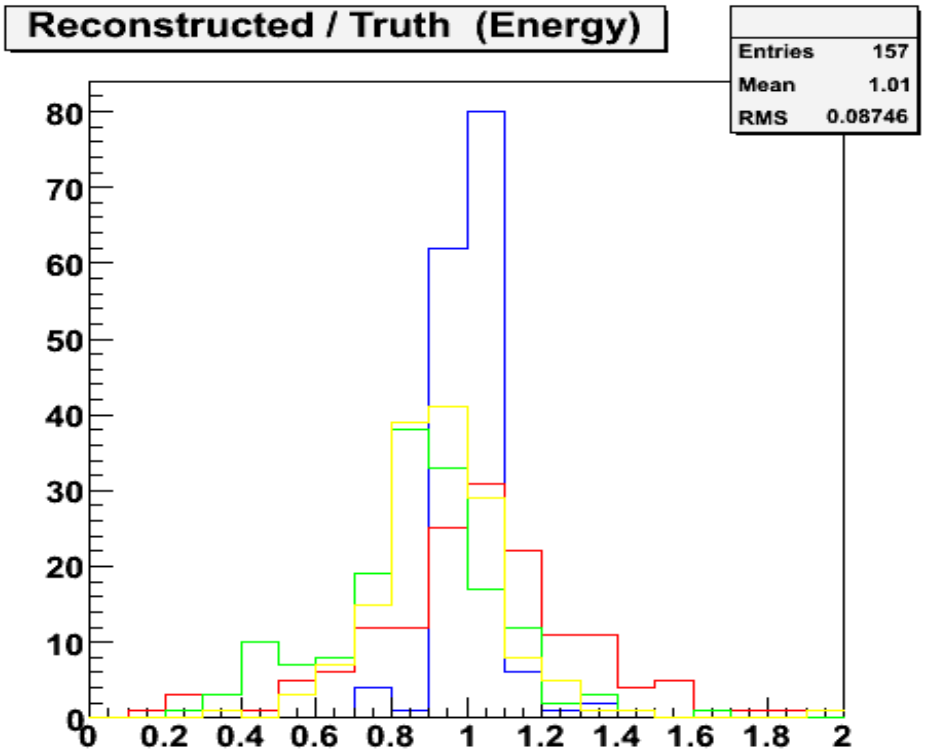


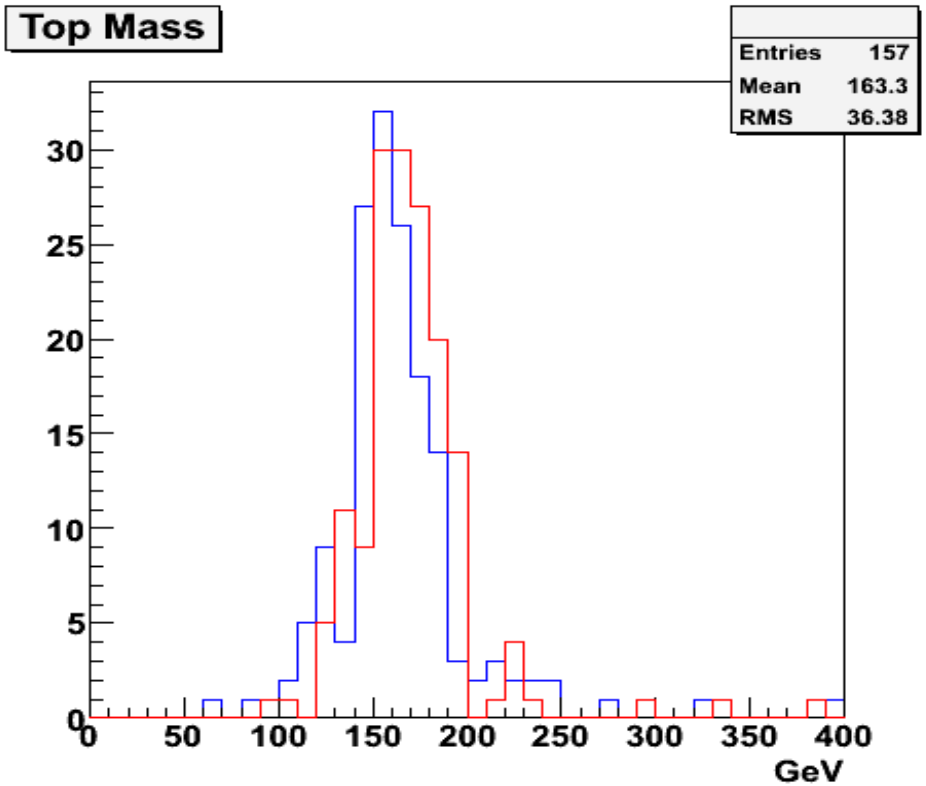


(just some simple sanity checks that the starting point is correct)

blue: e
red: ϑ
green: b jets
yellow: light jets

blue: hadronic
red: leptonic



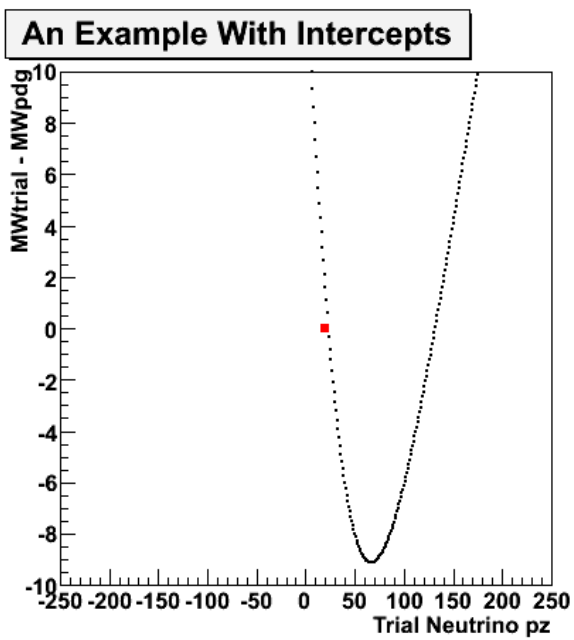


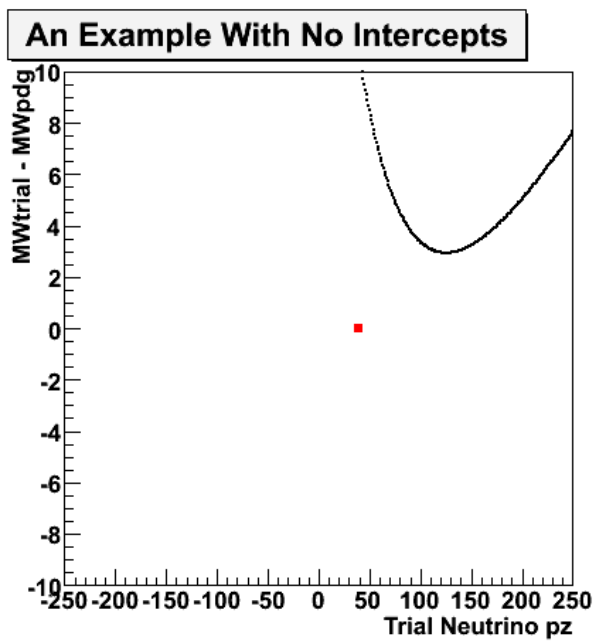
1st non-trivial decision: what's the ϑpz?

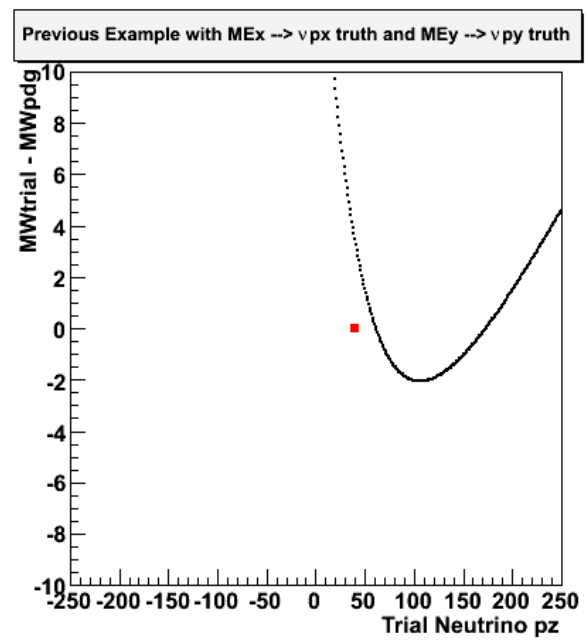
i.) proceed on the assumption that METx = ϑpx (and y)

ii.) $\vartheta E^2 - (\vartheta px^2 + \vartheta py^2 + \vartheta pz^2) = 0$ & $M_W{}^2 = (\vartheta + e)^\mu (\vartheta + e)_\mu$

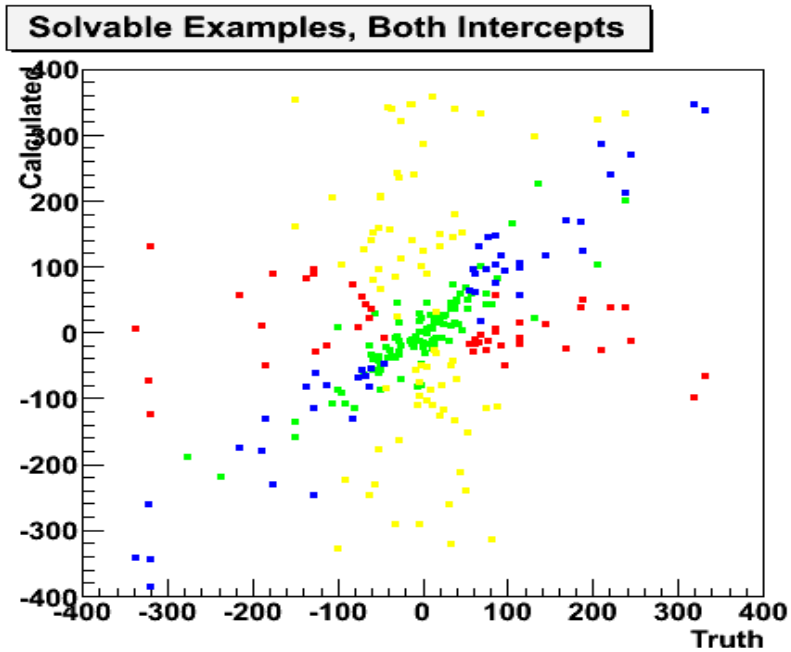
iii.) if the above has 2 solutions, find some way to pick the best, if 0 solutions, pick the point that gets you closest to M_W

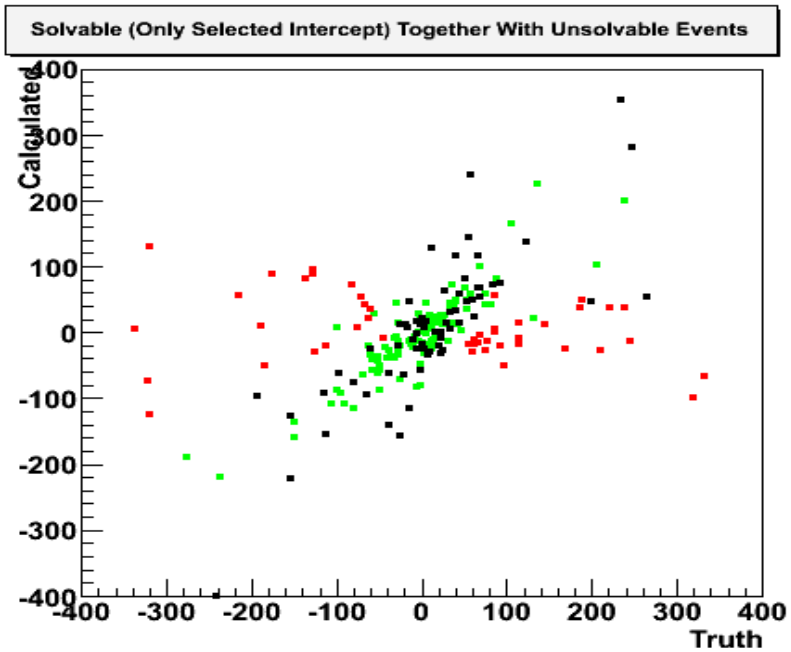


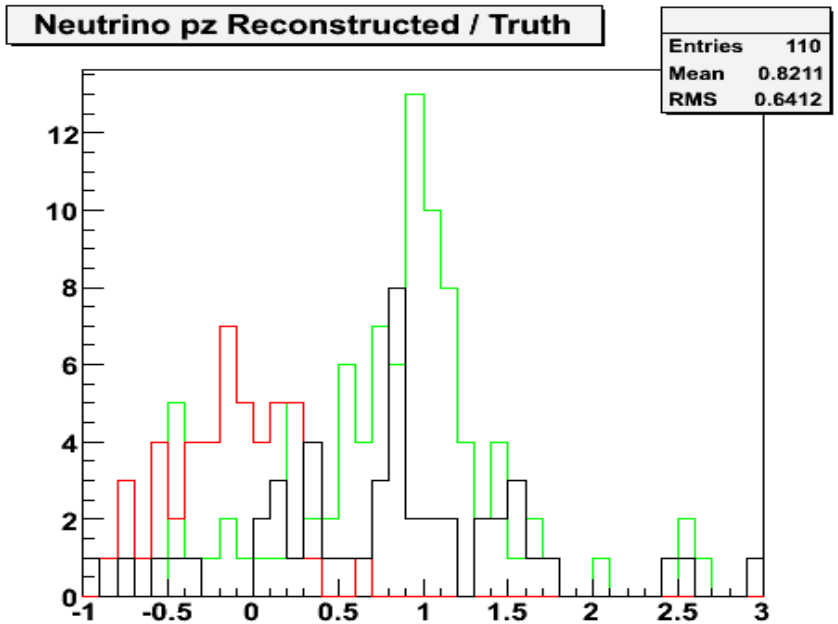


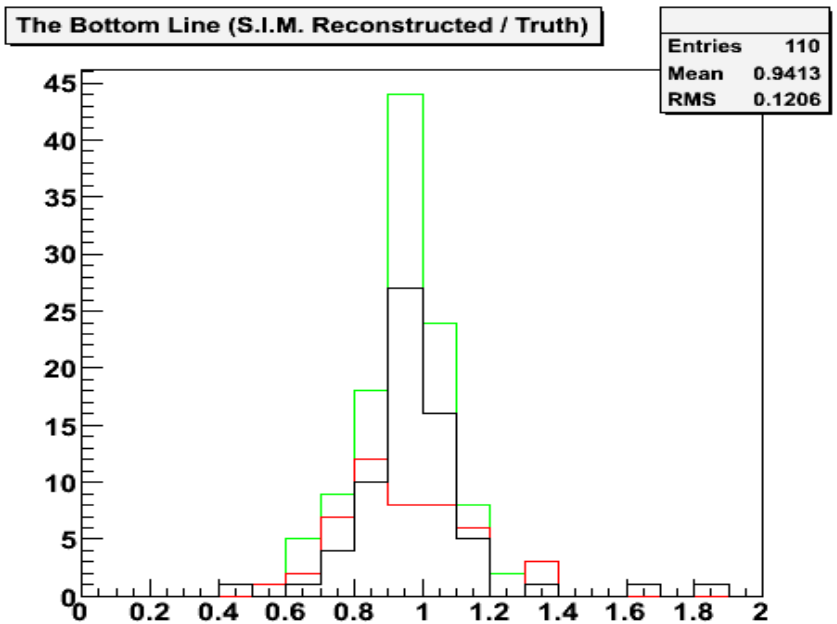


just picking whatever solution has smaller absolute value

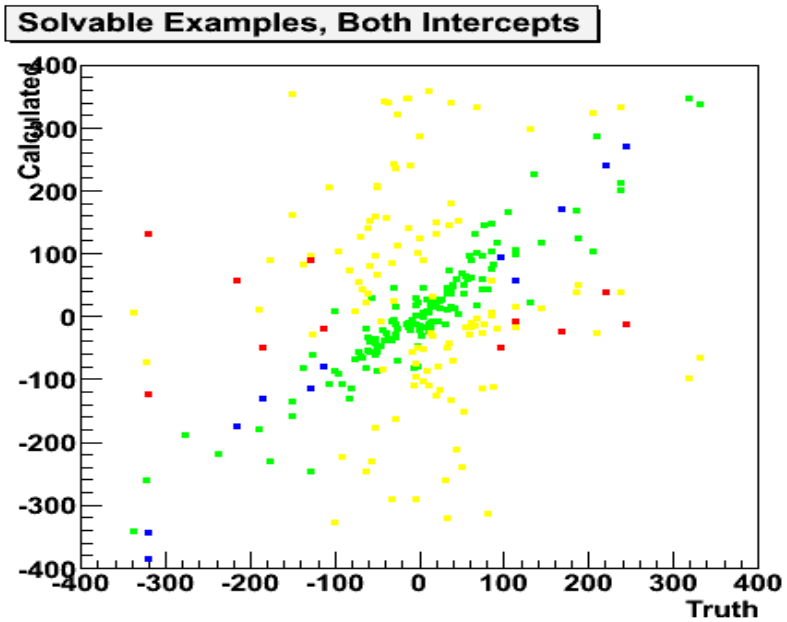


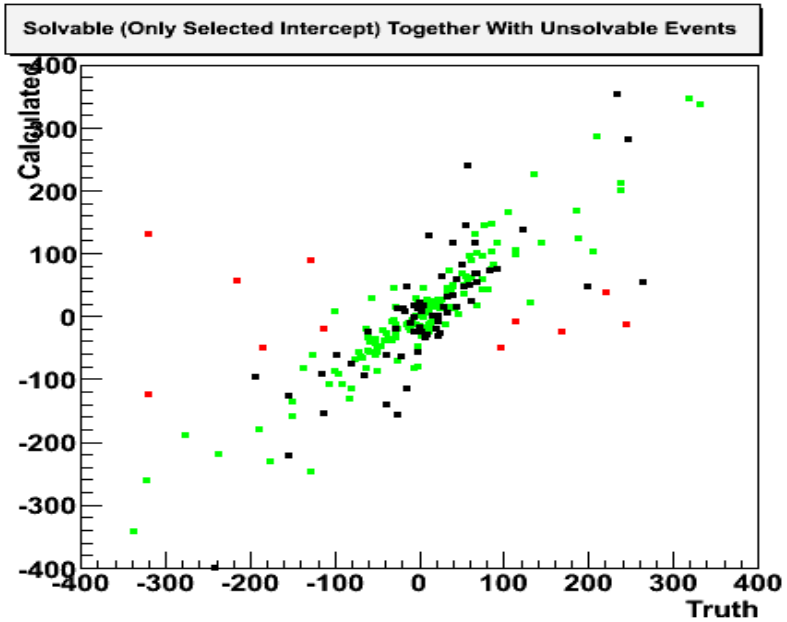


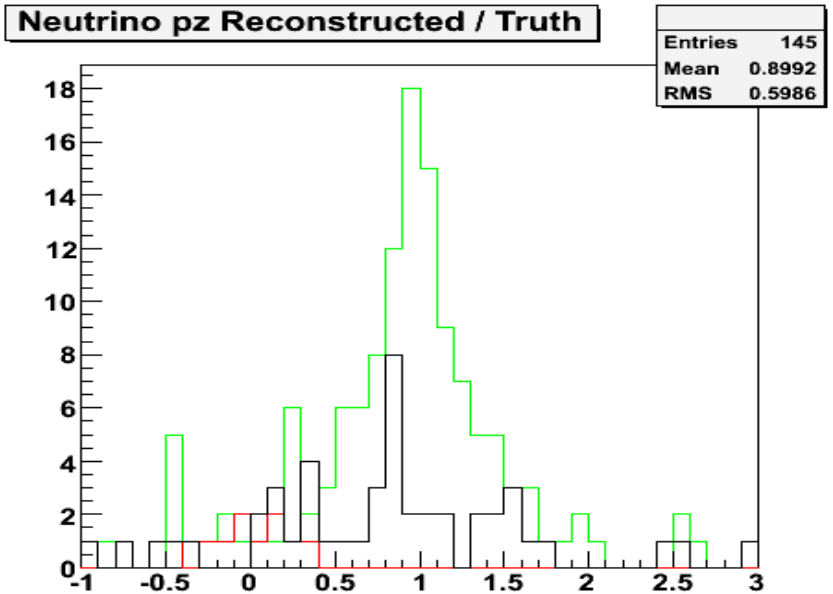


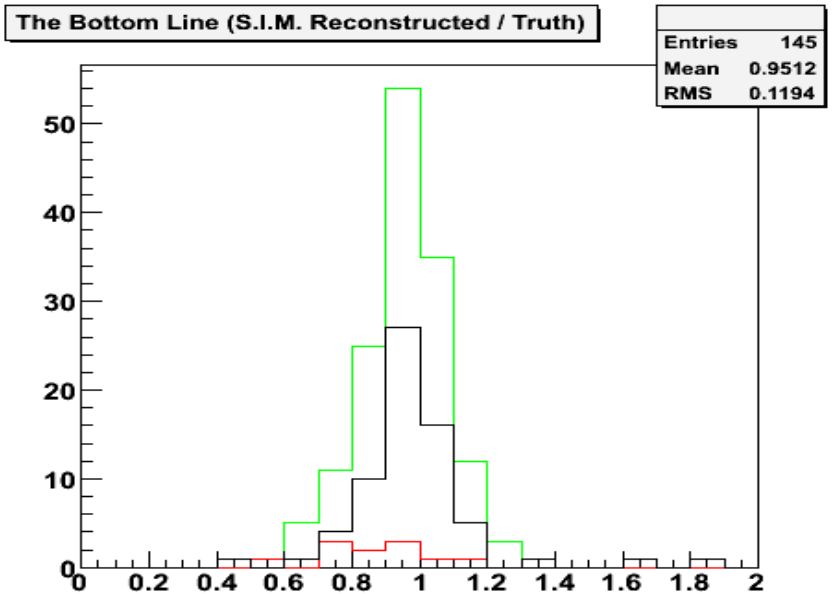


picking solution based on knowledge that W + *some* b jet came from a top









start over, i.e., peak to choose ϑpz

now 2nd non-trivial decision: given 2 b jets and N light jets, which 2 light jets came from the hadronically decaying W?

i.) (N choose 2) * (2) = (N) * (N-1) possible assignments

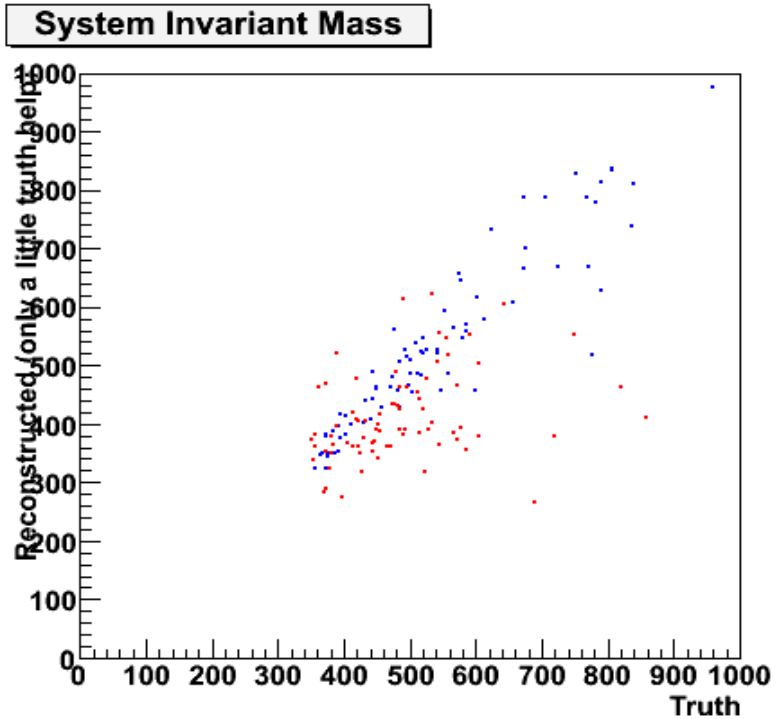
so this is totally ignoring possibility of any hard radiated gluons or anything like that

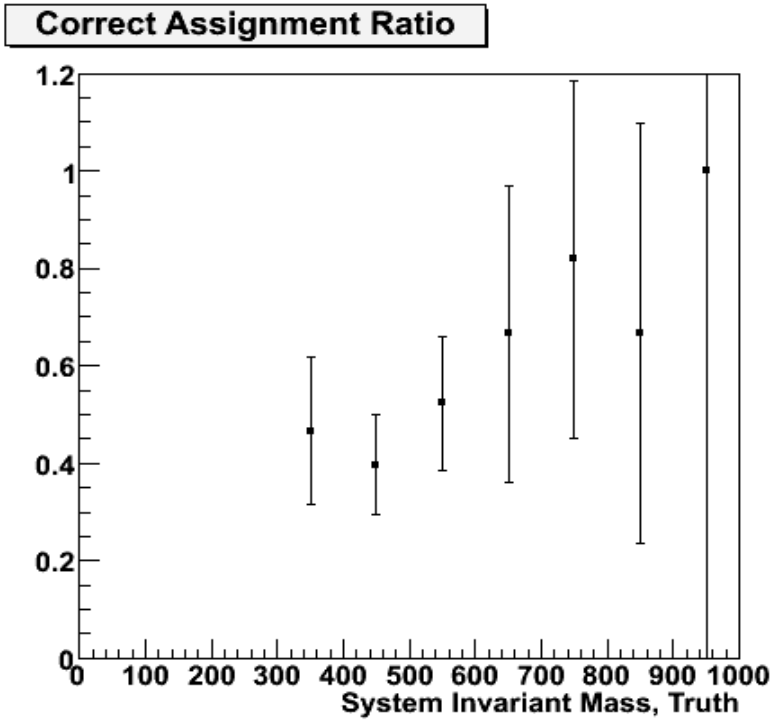
ii.) go with the assignment that minimizes

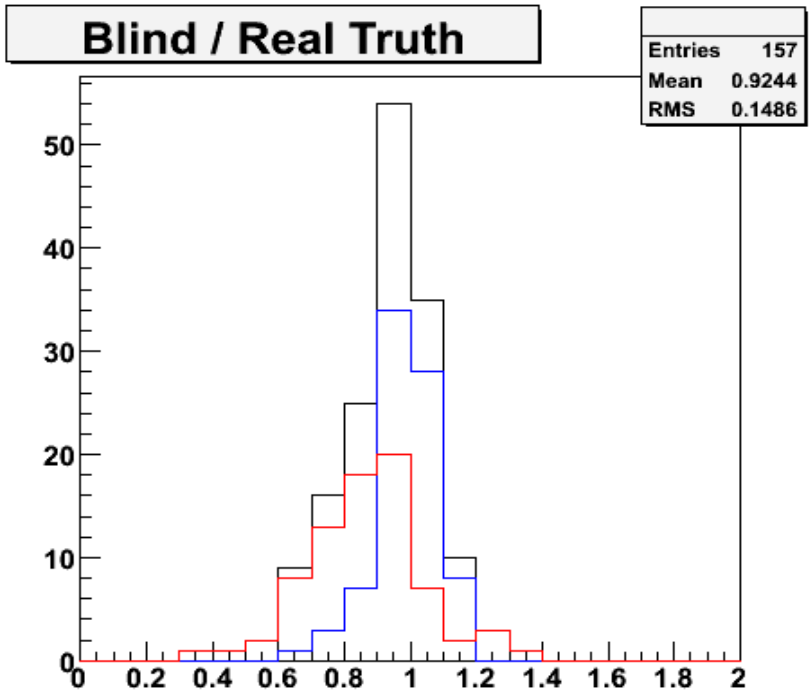
$$(M^{TRIAL}_{hadTOP}-M_{TOP})^2 + (M^{TRIAL}_{lepTOP}-M_{TOP})^2 + (M^{TRIAL}_{hadW}-M_{W})^2$$

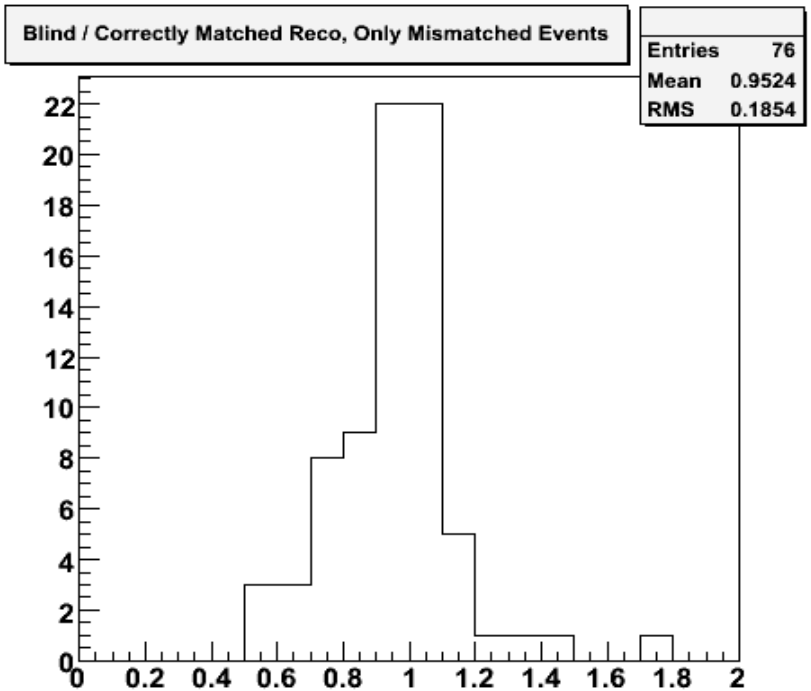
so peaking at the truth info here is used to give us 100% b tagging efficiency with 0% fakes.

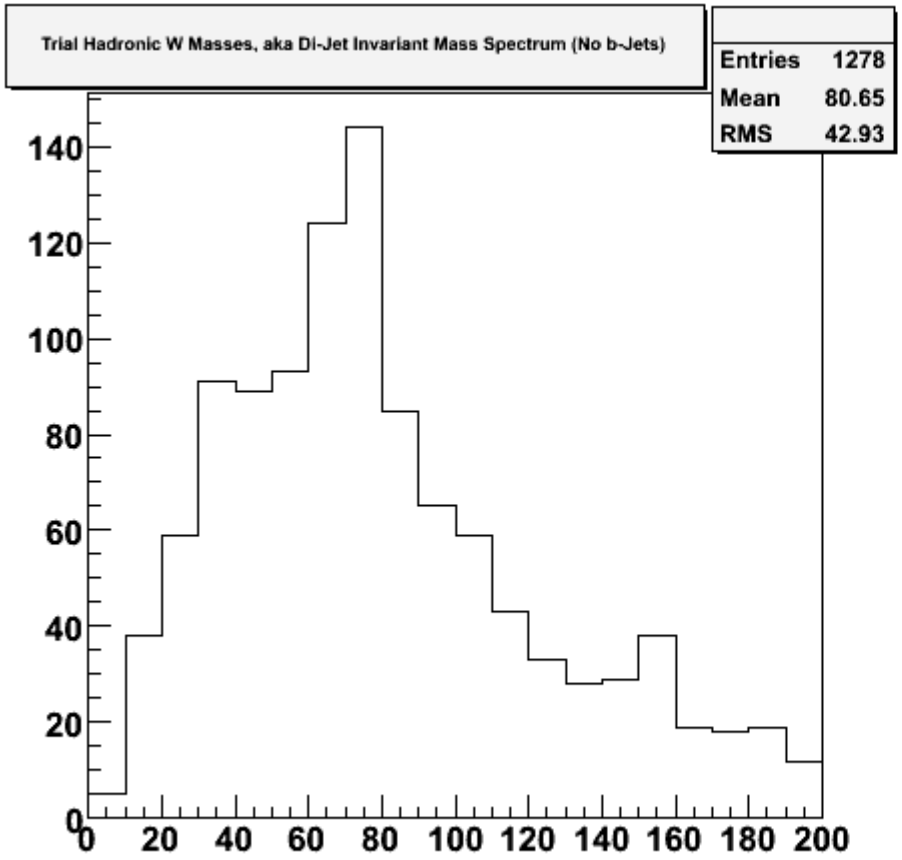
it's also used to give the electron and the correct ϑpz, but my *guess* is that this is a much smaller win than the perfect b tagging

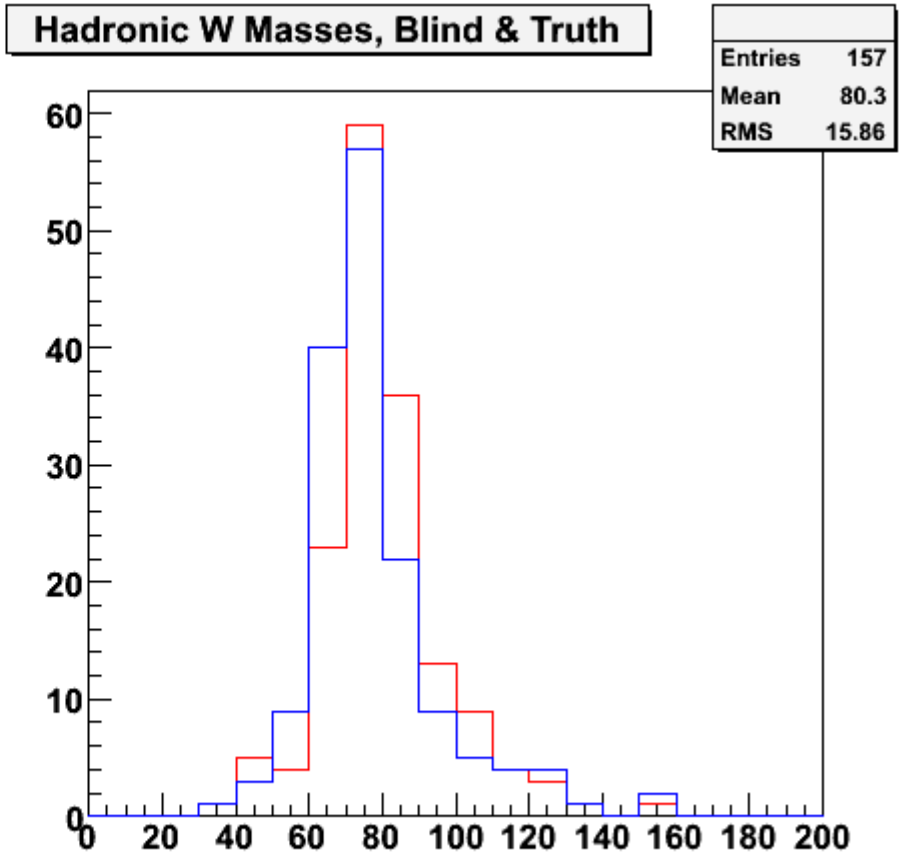

System Invariant Mass
Reconstructed / only a little truth help
Truth

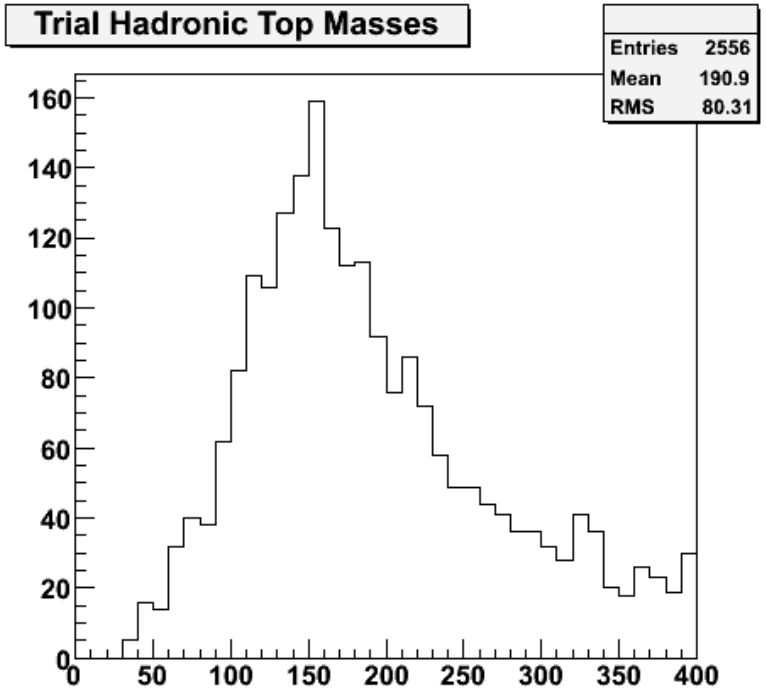

Correct Assignment Ratio
System Invariant Mass, Truth

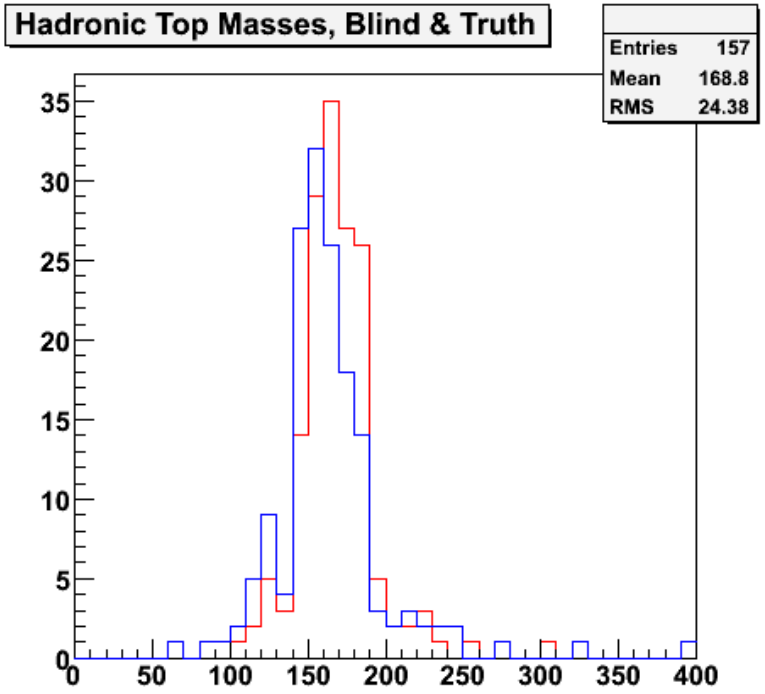

Blind / Real Truth
Entries 157
Mean 0.9244
RMS 0.1486

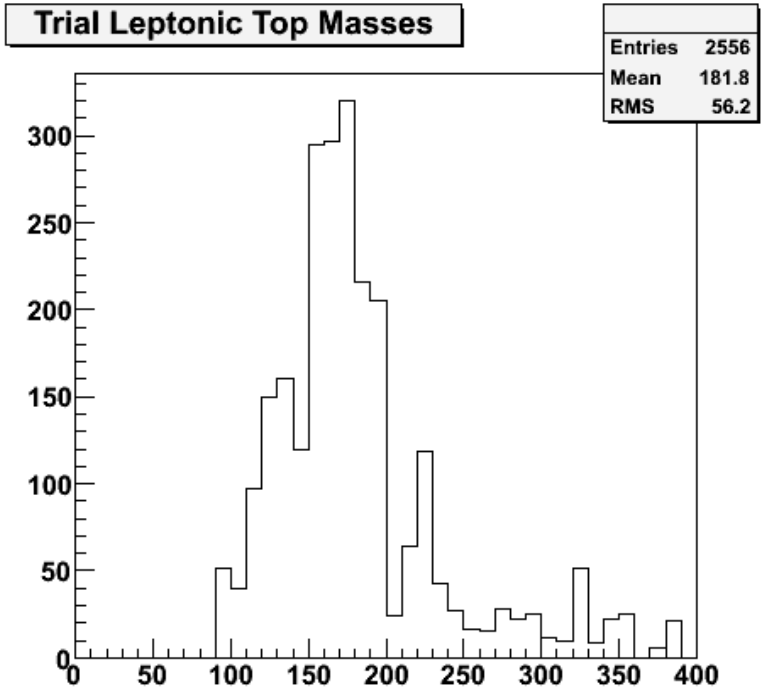

Blind / Correctly Matched Reco, Only Mismatched Events
Entries 76
Mean 0.9524
RMS 0.1854

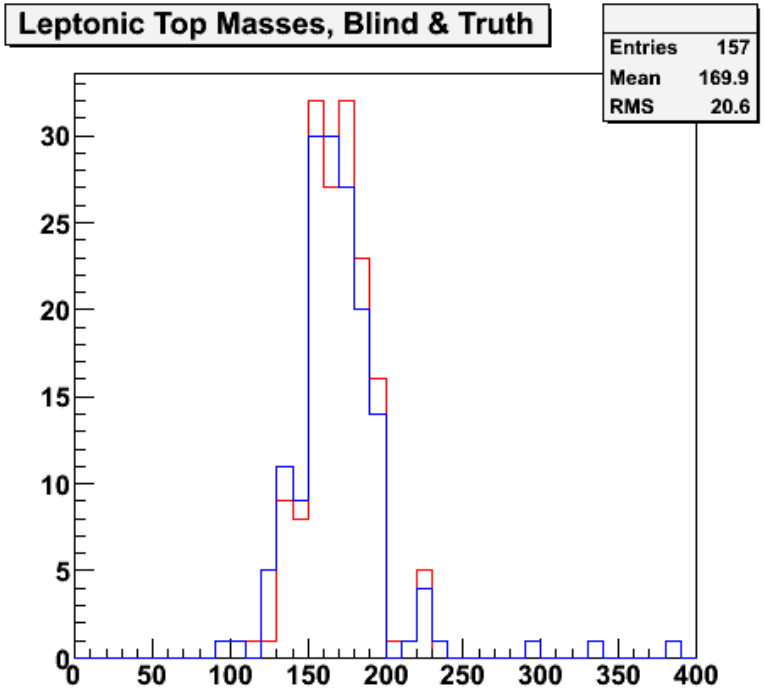

Trial Hadronic W Masses, aka Di-Jet Invariant Mass Spectrum (No b-Jets)
Entries 1278
Mean 80.65
RMS 42.93
0
20
40
60
80
100
120
140
0
20
40
60
80
100
120
140
160
180
200


Hadronic W Masses, Blind & Truth
Entries 157
Mean 80.3
RMS 15.86
0
10
20
30
40
50
60
0
20
40
60
80
100
120
140
160
180
200

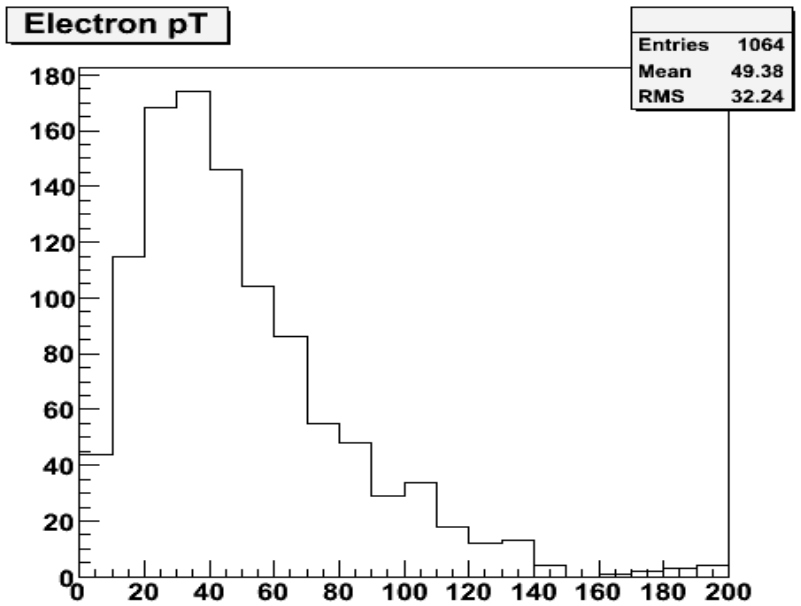

Trial Hadronic Top Masses
Entries 2556
Mean 190.9
RMS 80.31
0 20 40 60 80 100 120 140 160
0 50 100 150 200 250 300 350 400

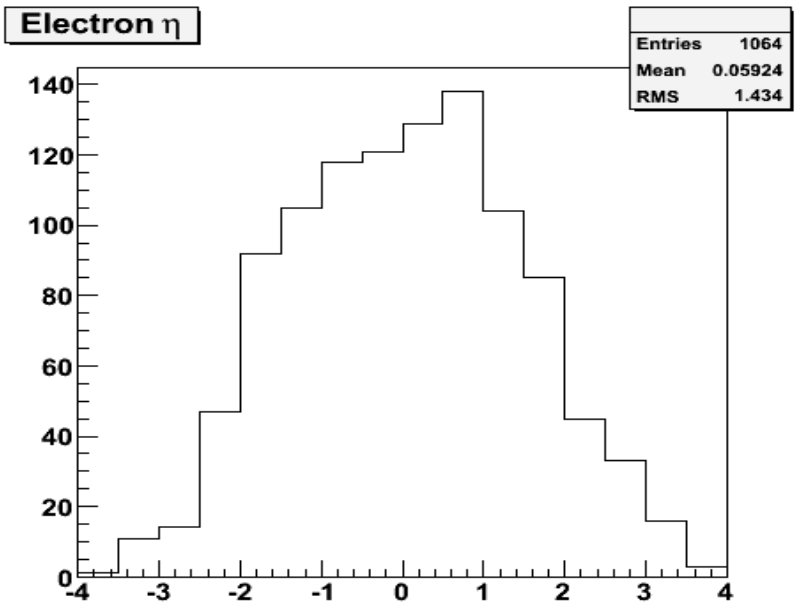

Hadronic Top Masses, Blind & Truth
Entries 157
Mean 168.8
RMS 24.38
0 5 10 15 20 25 30 35
0 50 100 150 200 250 300 350 400

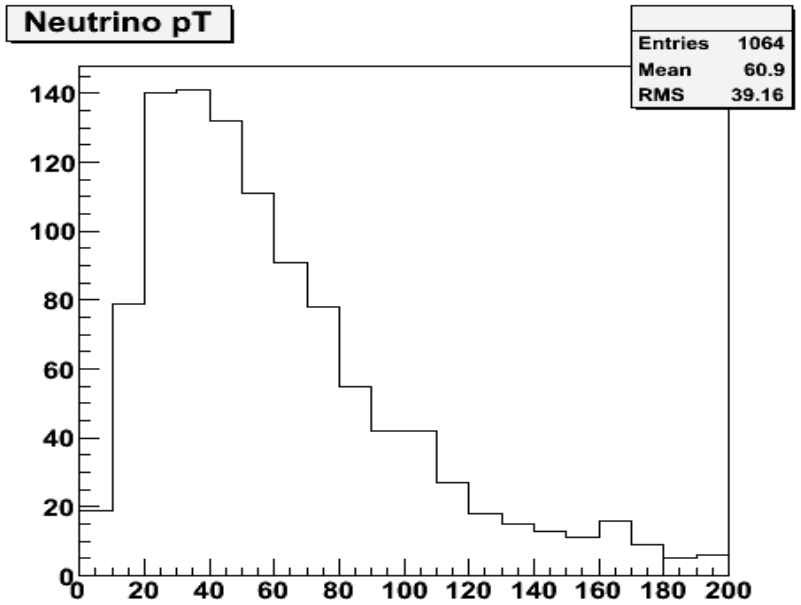

Trial Leptonic Top Masses
Entries 2556
Mean 181.8
RMS 56.2
0 50 100 150 200 250 300
0 50 100 150 200 250 300 350 400

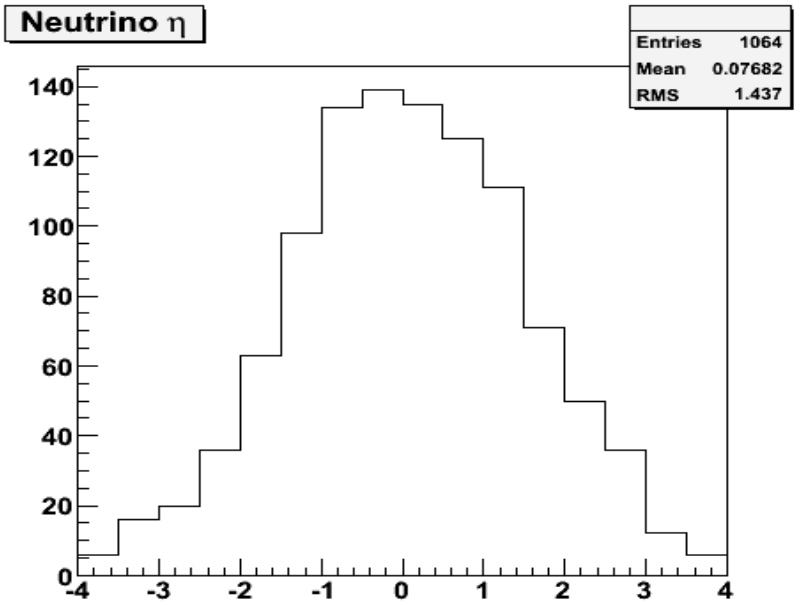
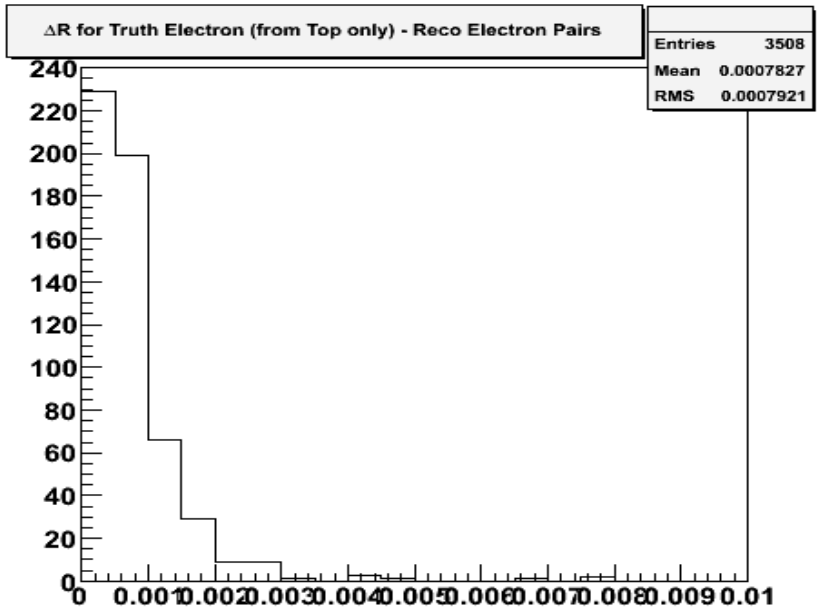
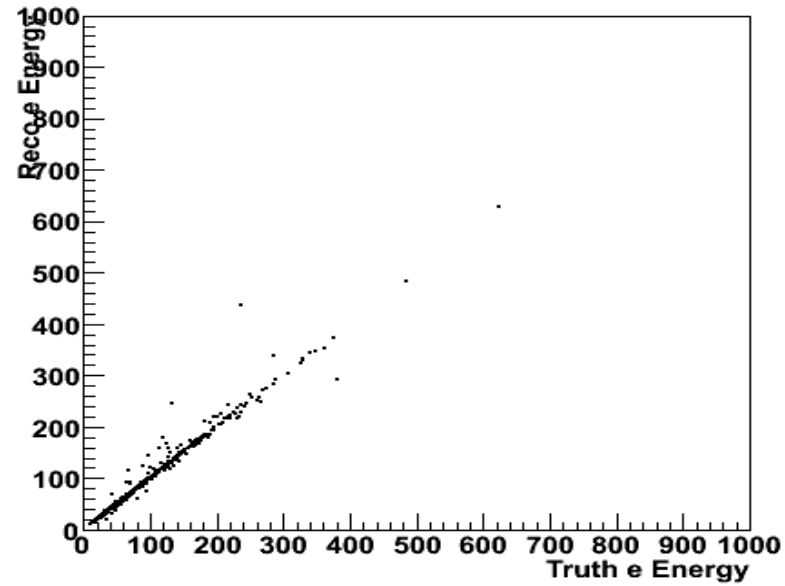
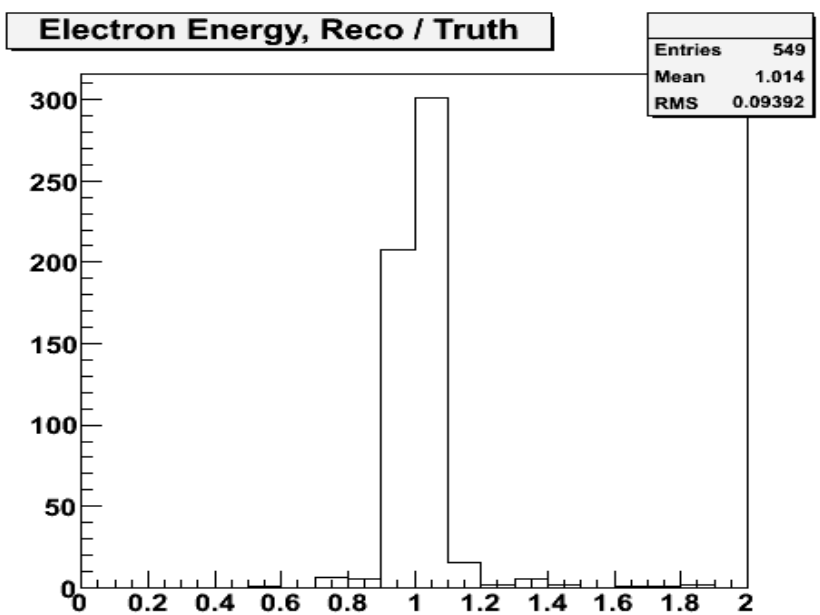
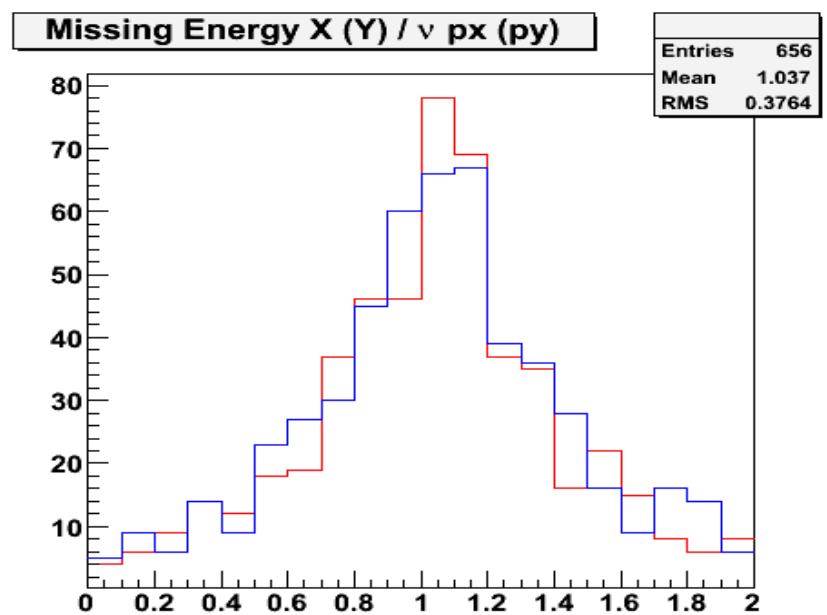

Leptonic Top Masses, Blind & Truth
Entries 157
Mean 169.9
RMS 20.6
0 5 10 15 20 25 30
0 50 100 150 200 250 300 350 400

basic lepton kinematics;
not really connected with the rest









lepton truth – reco comparisons