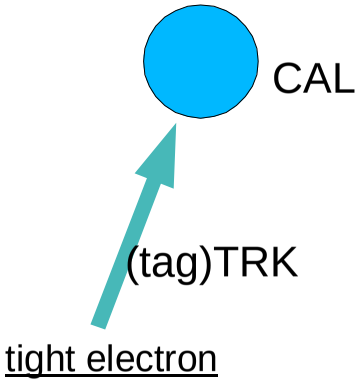
EM reco efficiency studies continued …

Samples

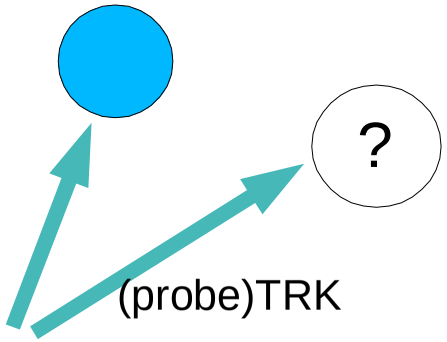
- Data:
  - EM1TRK skim
  - Single EM triggers
  - Run range: April 2003 till March 2004
  - Rejecting bad runs (CAL, SMT, CFT, Jet/Met, Lumi)
  - No t42 applied
  - Processed with ATHENA (v01-05-02)
- MC:
  - $Z/\gamma^* \rightarrow e^+e^-$ inclusive
  - Pythia
  - 400k events
  - Request IDs: 12018, 12028, 12029, 12030
  - Processed with ATHENA (v01-05-02)

Tag & Probe Method

Tag:



Probe:



Z(ee) + n Jets Analysis Cuts:

PVX < 60cm

Tag-Electron: EMF > 0.9, Iso < 0.15, HMx7 < 12., p_T > 25 GeV, $|\eta|$ < 1.1, with phi cracks, matched with a good track in ΔR(<0.14)

Trigger: tag electron is required to have fired trigger

Tag & ProbeTracks: 25 GeV < p_T < 80 GeV, Chi2 < 8.0, |DCA0| < 0.3, |DCA1| < 4.0, $|\eta|$ < 1.1, with phi cracks

Probe: Good track separated from Tag by $\Delta\phi$ > 2.0

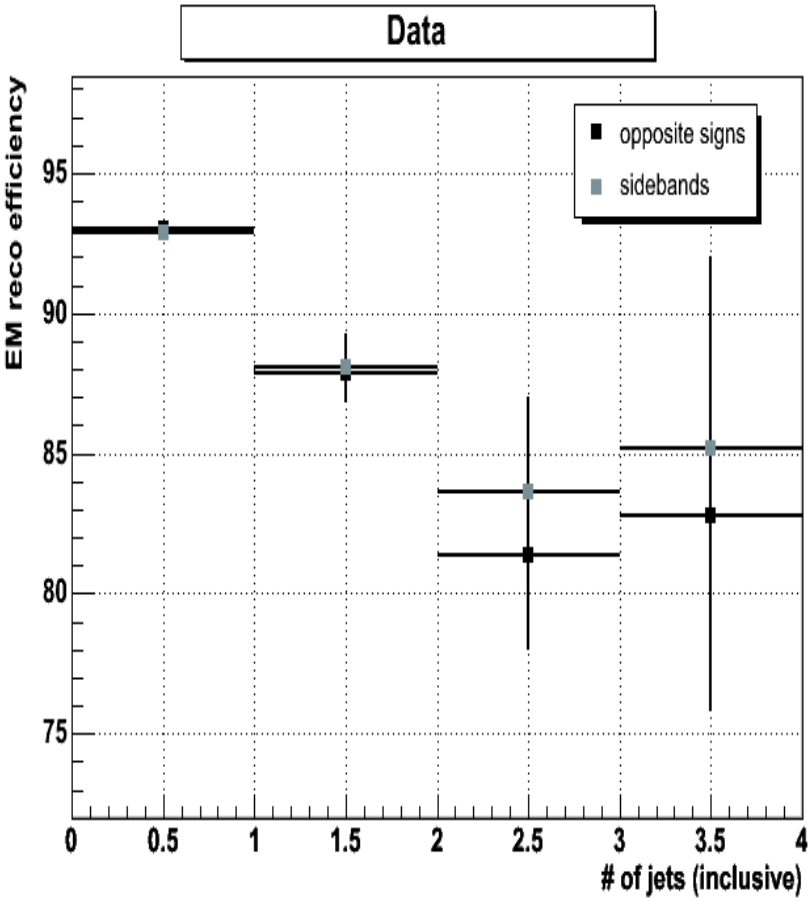
Opposite sign track requirement to reduce background

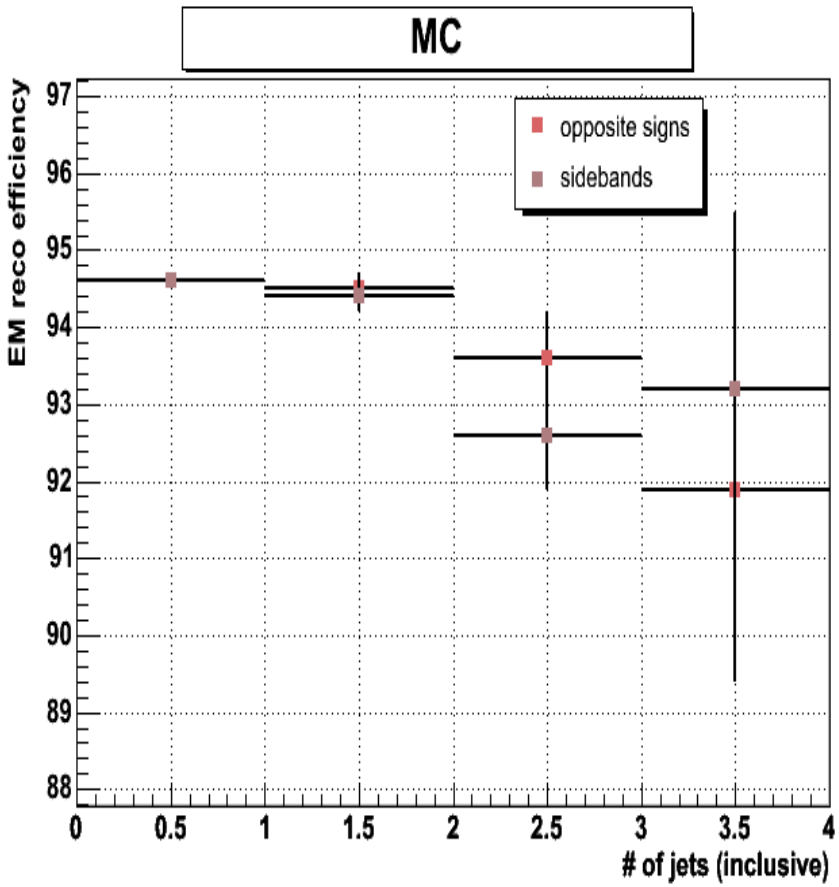
TagElec-ProbeTrack-invmass cut: 70 GeV < M_{ee} < 110 GeV

Reco matching cone: dR = SQRT($\Delta\eta^2 + \Delta\phi^2$) = SQRT($.1^2$+$.1^2$) = 0.14

Jets: 0.05 < EMF < 0.95, HotF < 10.0, N90 > 1, CHF < 0.4, L1conf, p_T > 20., |eta| < 2.0, not counting jets overlapping with probe tracks within ΔR < 0.4

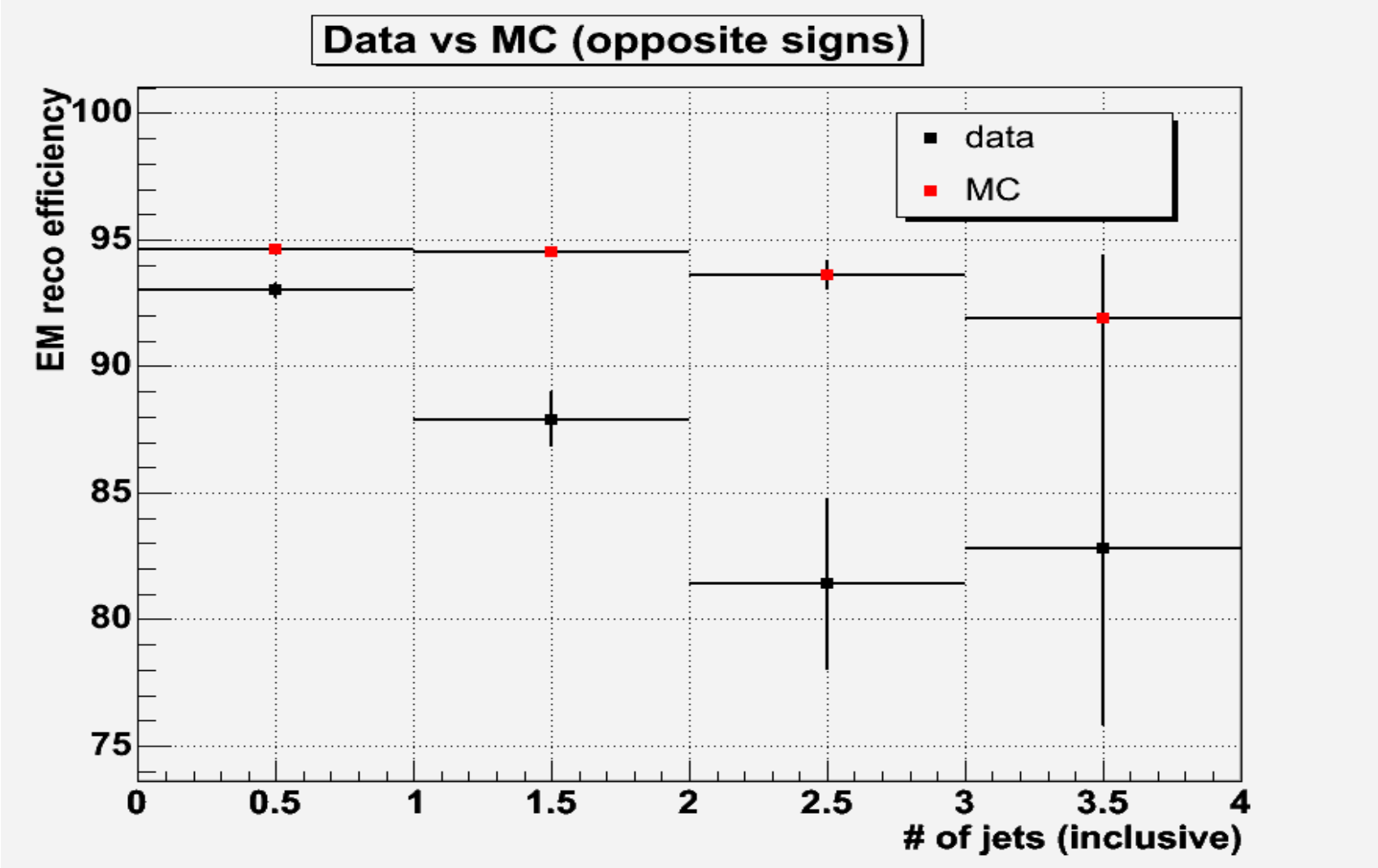
Opposite signs vs sidebands



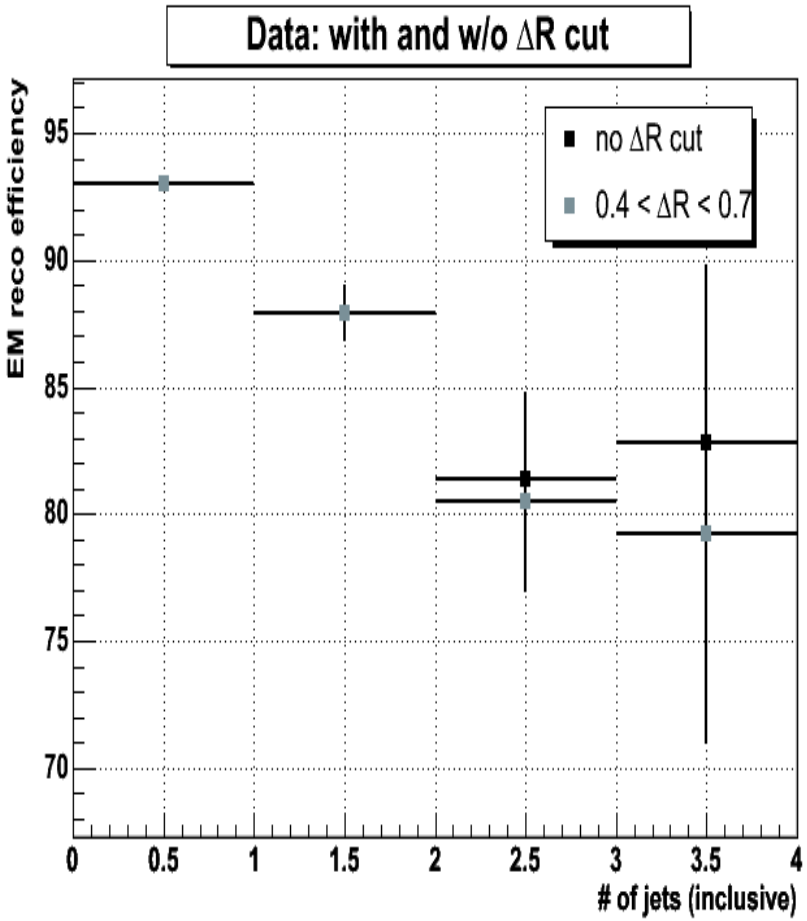


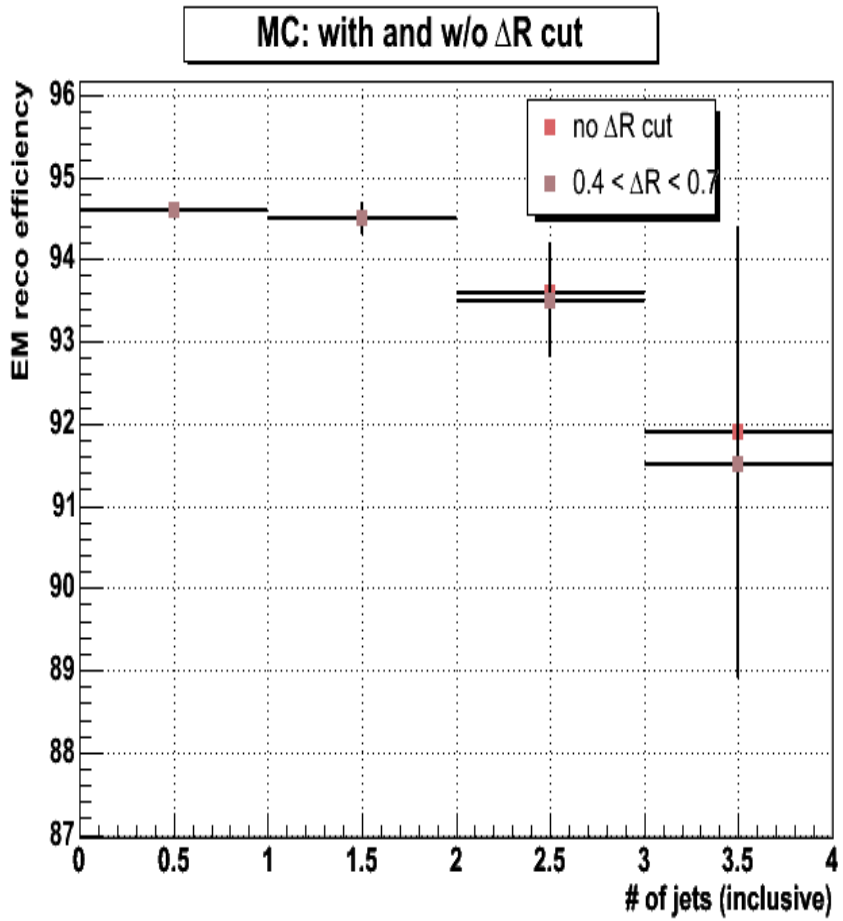
Investigating different background reduction methods. 'Opposite sign' requires tag and probe tracks to have different signs. 'Sidebands' uses the 40-70GeV and 110-140GeV sidebands of the M_{ee} distribution to estimate and then substract background.

Data vs MC


Data vs MC (opposite signs)
EM reco efficiency
100
95
90
85
80
75
0
0.5
1
1.5
2
2.5
3
3.5
4
# of jets (inclusive)
data
MC

ΔR cut





Tests wether nearby jet activity could cause decrease in efficiency as jet multiplicity increases.

Investigating the inefficiencies

The following slides plot parameters for events that don't have a reconstructed EM cluster. I'm looking at the following cases:

Jet Multiplicity ≥ 1 in both data and MC (the '1' bin on page 5)

Jet Multiplicity ≥ 2 in both data and MC (the '2' bin on page 5)

In each case I plot: Run Number, jet multiplicity, TagElectron-ProbeTrack invariant mass, dR between probe and nearest good jet, Tight Electron properties (Eta, Phi, pT), Probe Track Properties (Eta, Phi, pT),

At the end I'm also including the plots for EM reco efficiency vs Probe Track pT (together with numerator and denominator histograms).

Also, for each case the tables that Jan requested can be found at the following location (file names should be self explanatory):

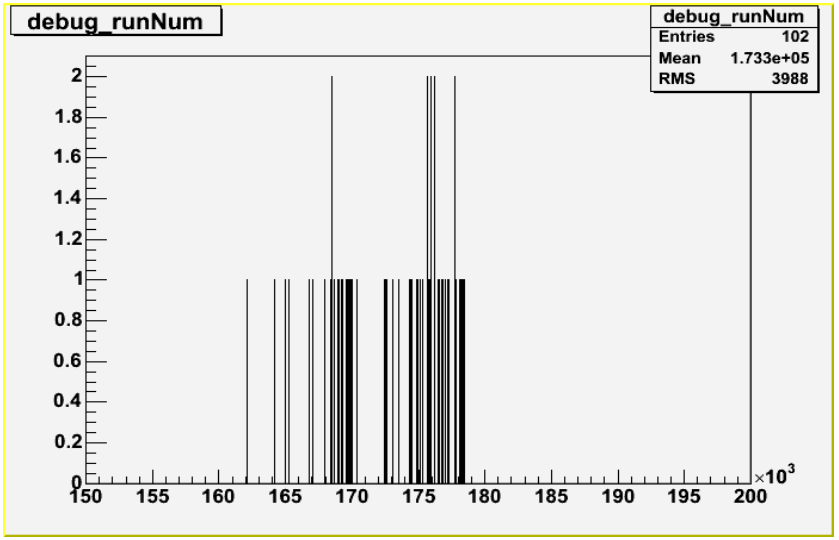
/work/maxwell-clued0/marc/higgs/jun09_2004/EMID/data1.txt

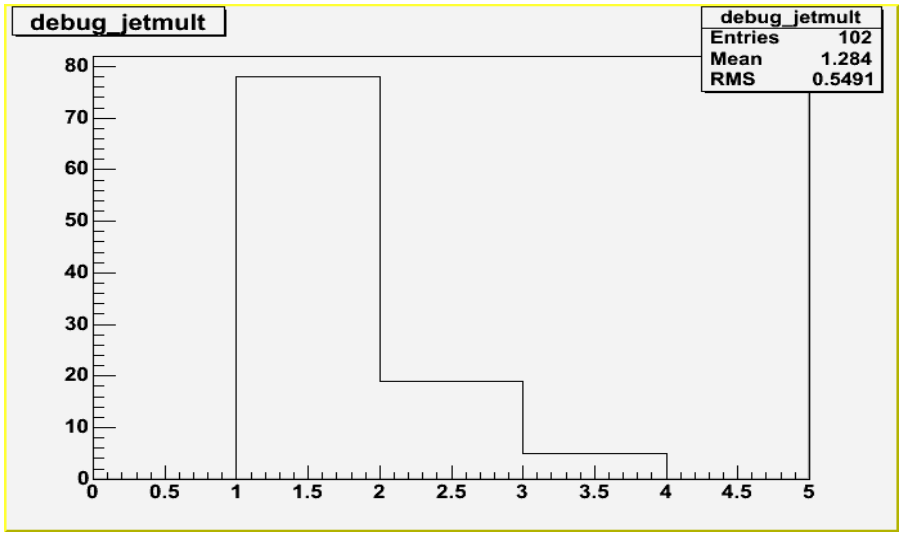
/work/maxwell-clued0/marc/higgs/jun09_2004/EMID/data2.txt

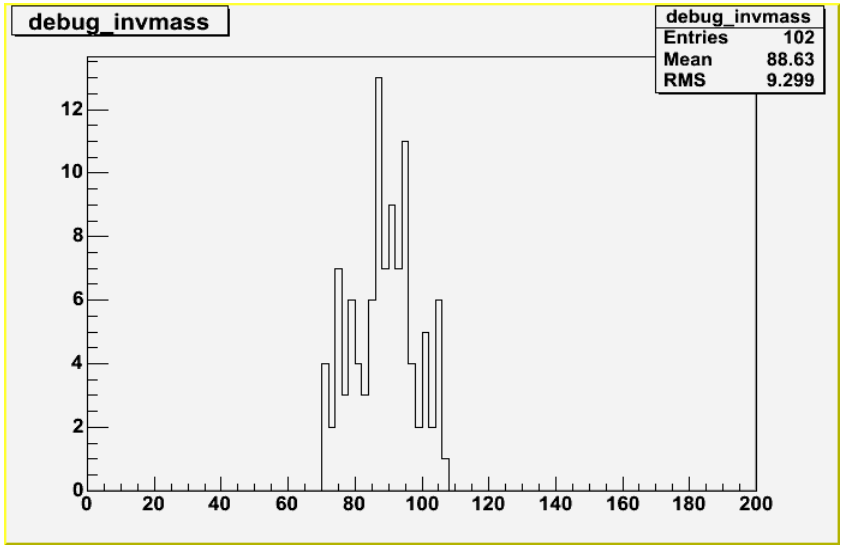
/work/maxwell-clued0/marc/higgs/jun09_2004/EMID/MC1.txt

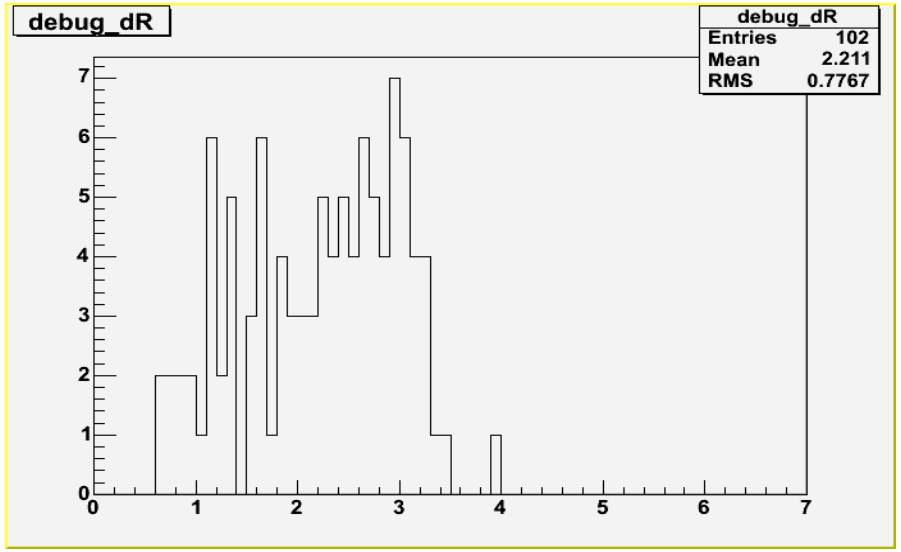
/work/maxwell-clued0/marc/higgs/jun09_2004/EMID/MC2.txt

Jet Multiplicity ≥ 1 (data)

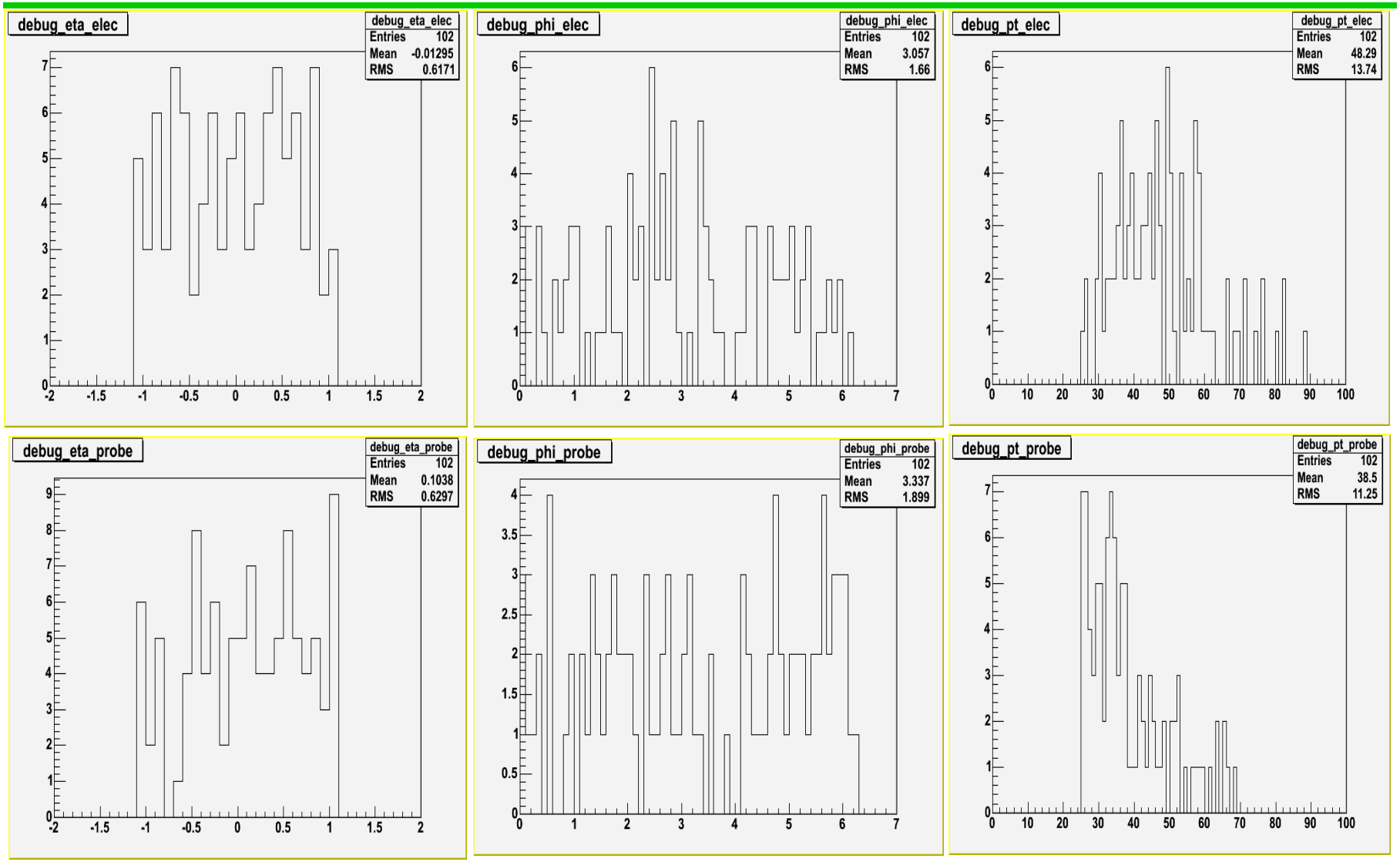




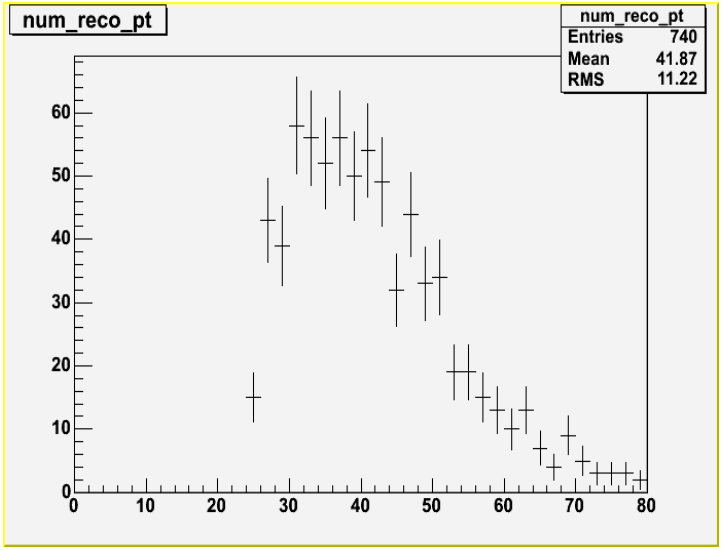


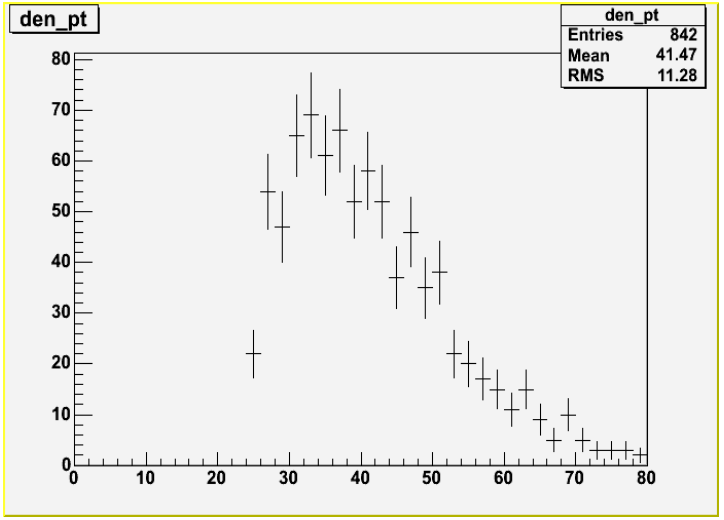


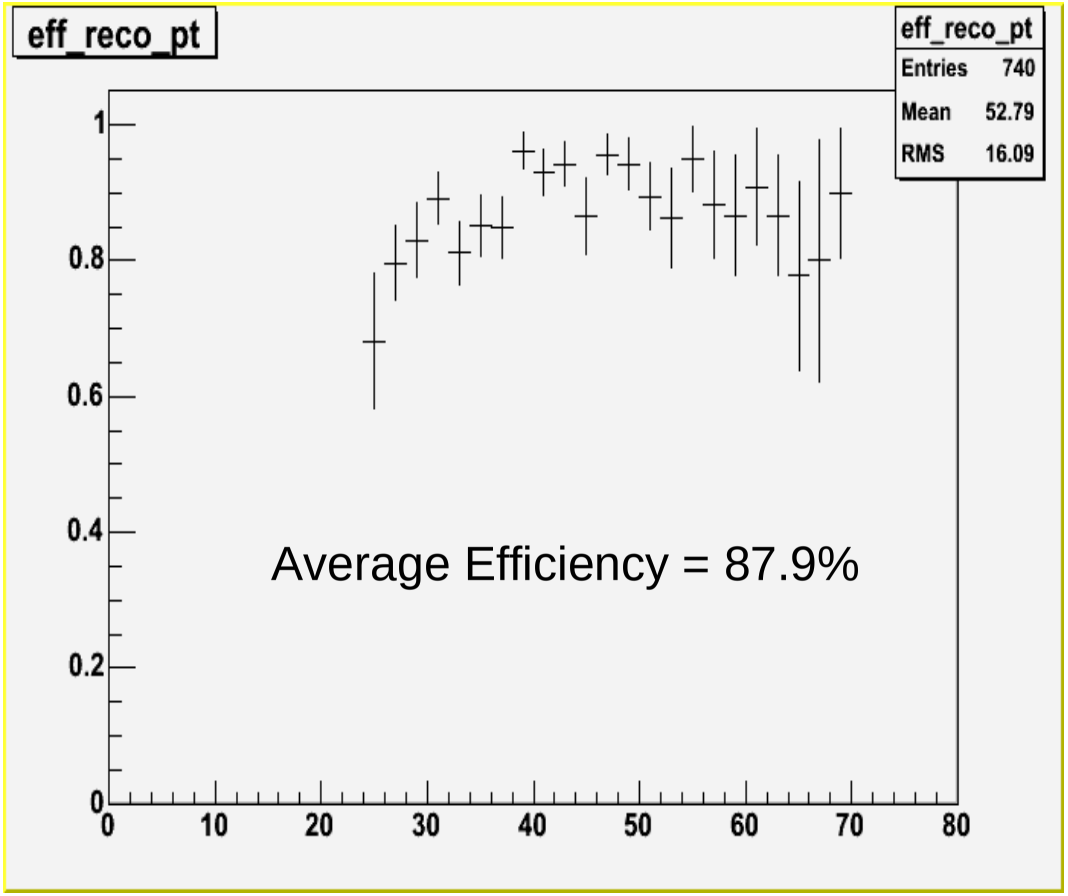
Jet Multiplicity ≥ 1 (data) contd.



Jet Multiplicity ≥ 1 (data) contd.







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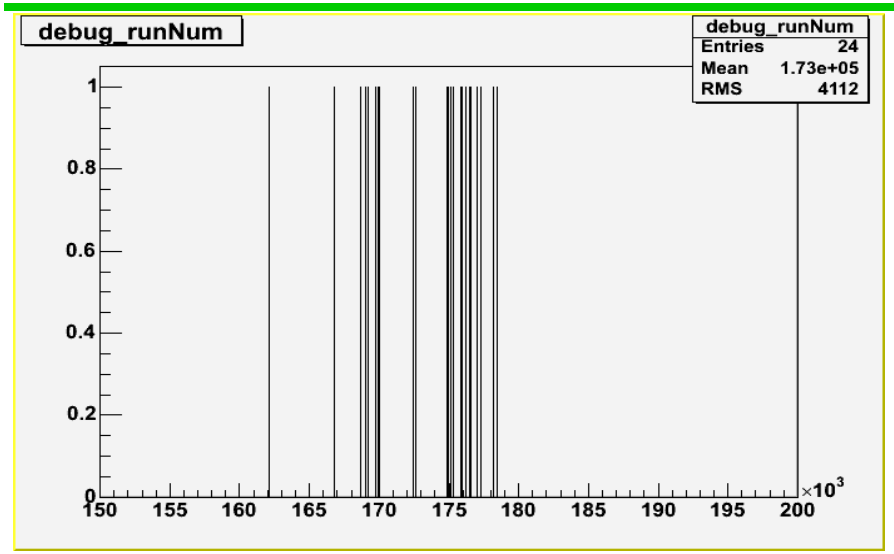

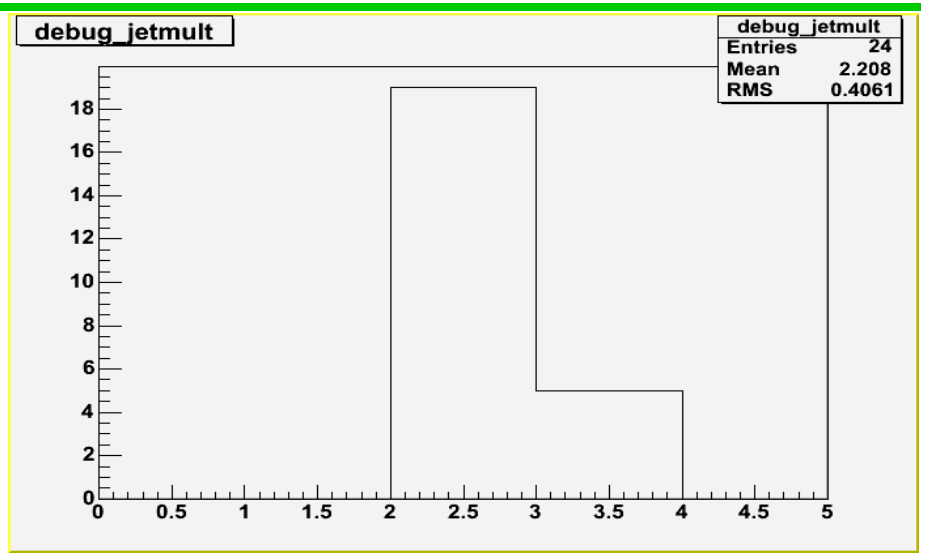

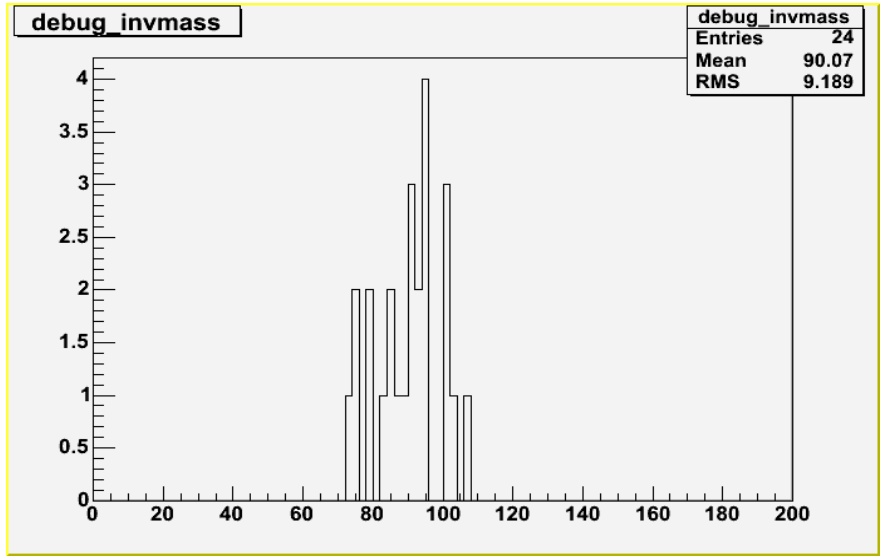

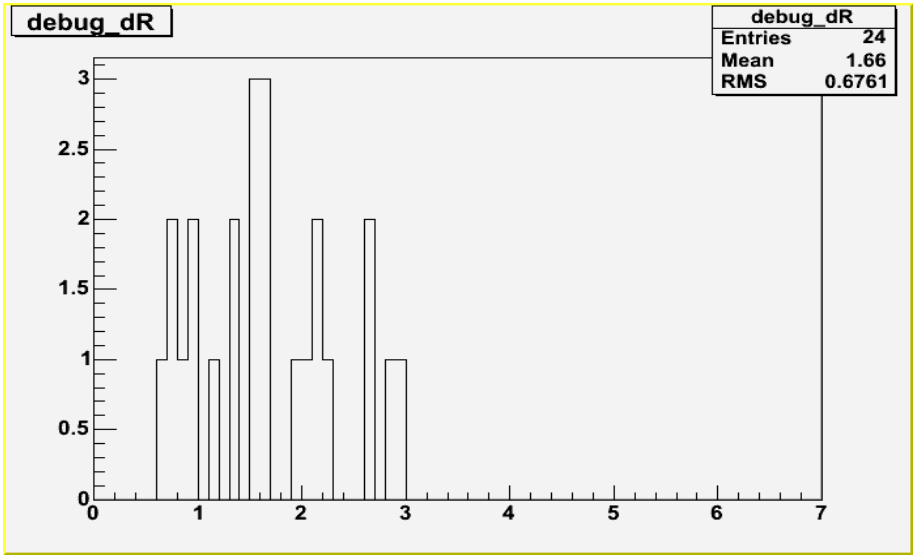

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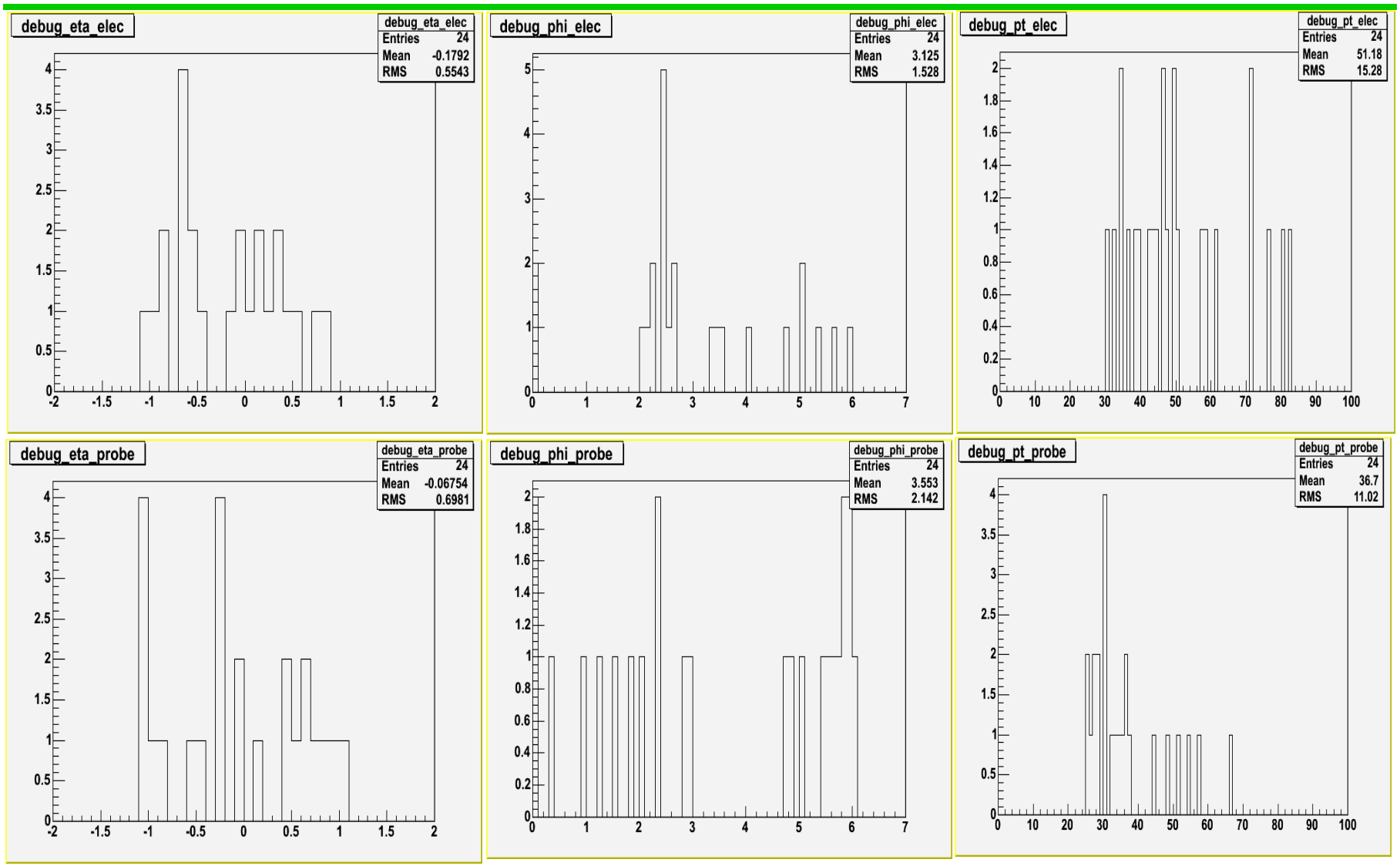

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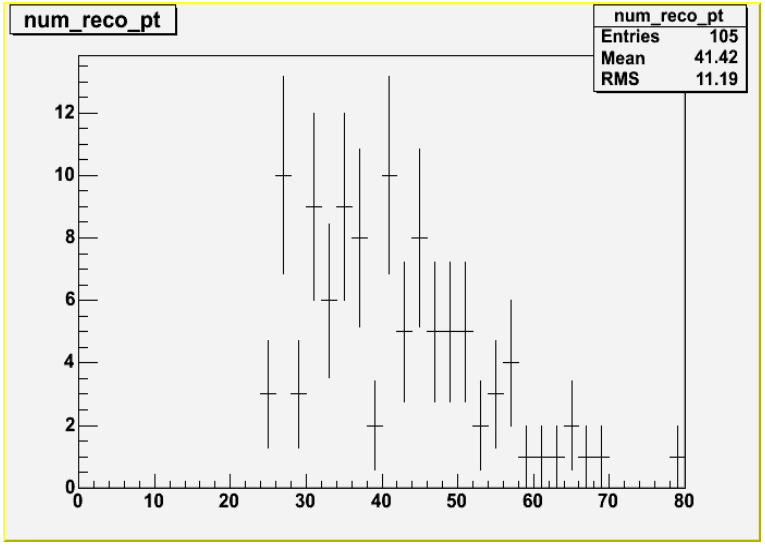
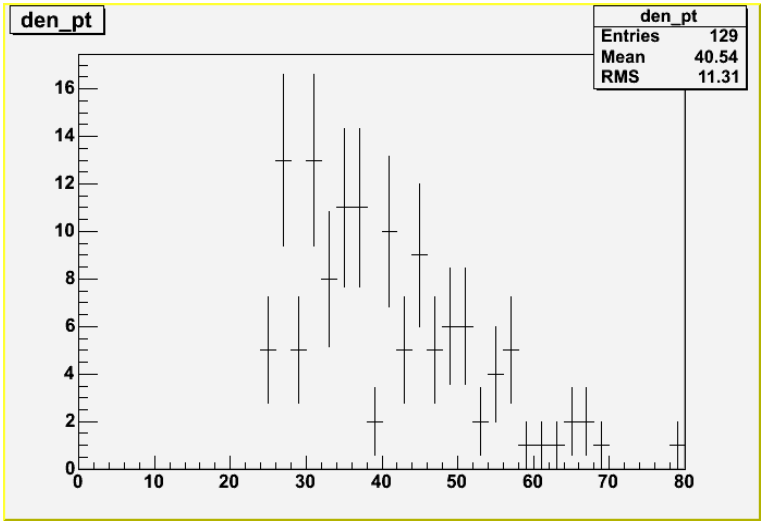
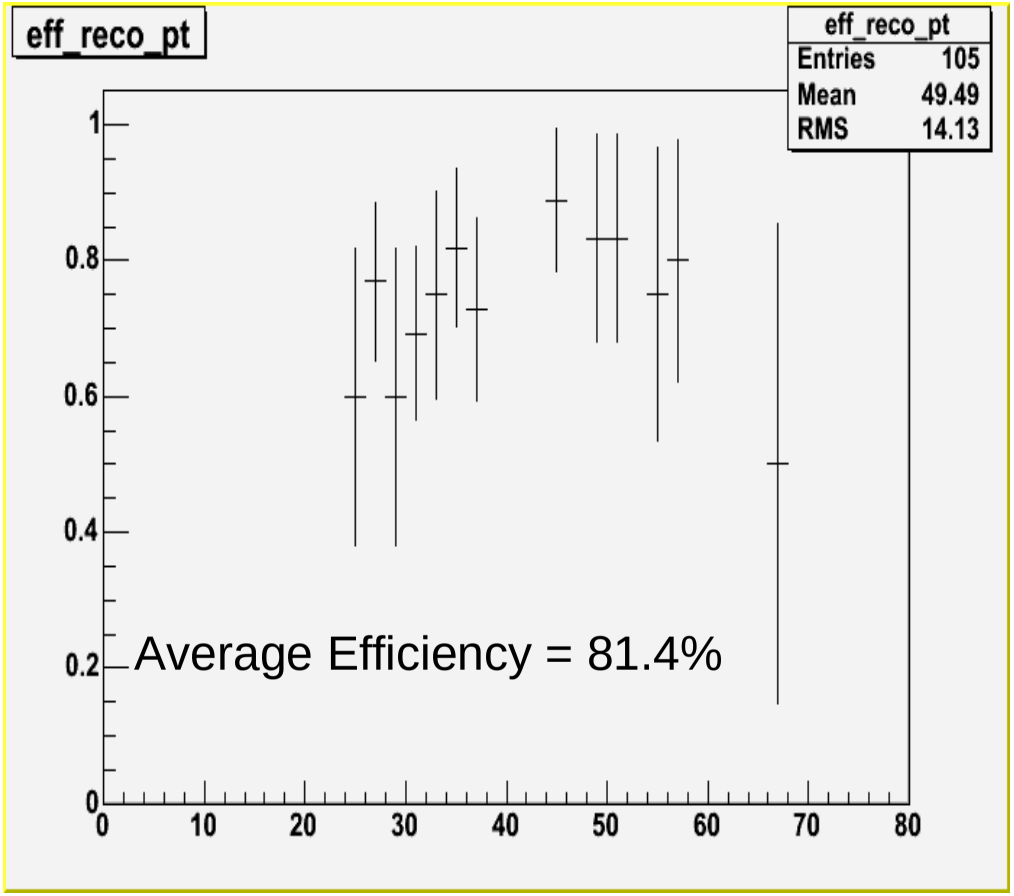
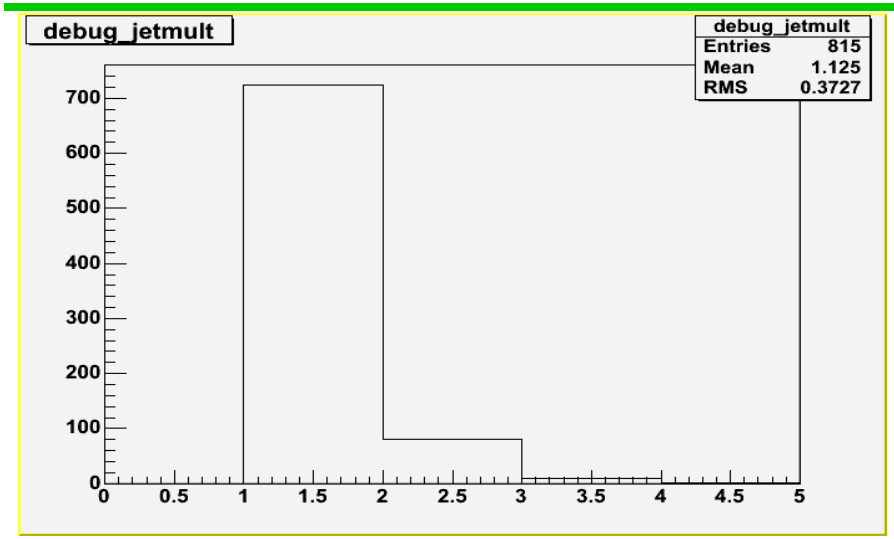
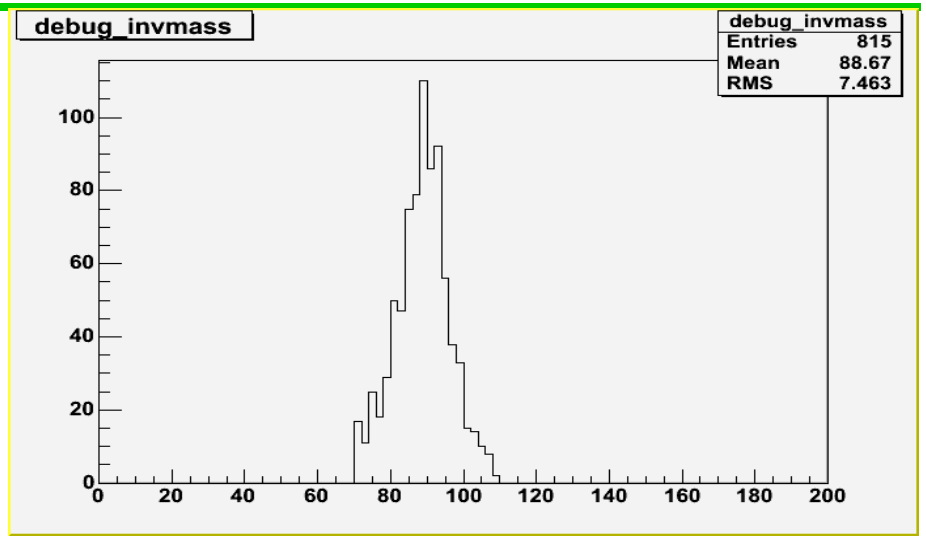


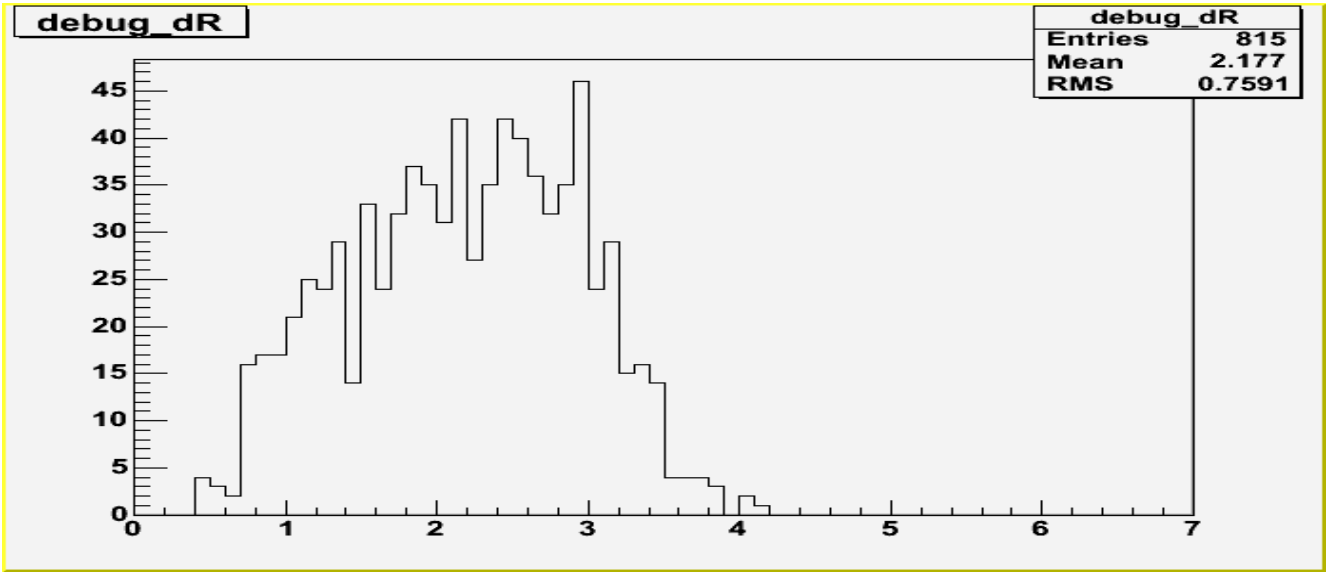




Jet Multiplicity ≥ 1 (MC)







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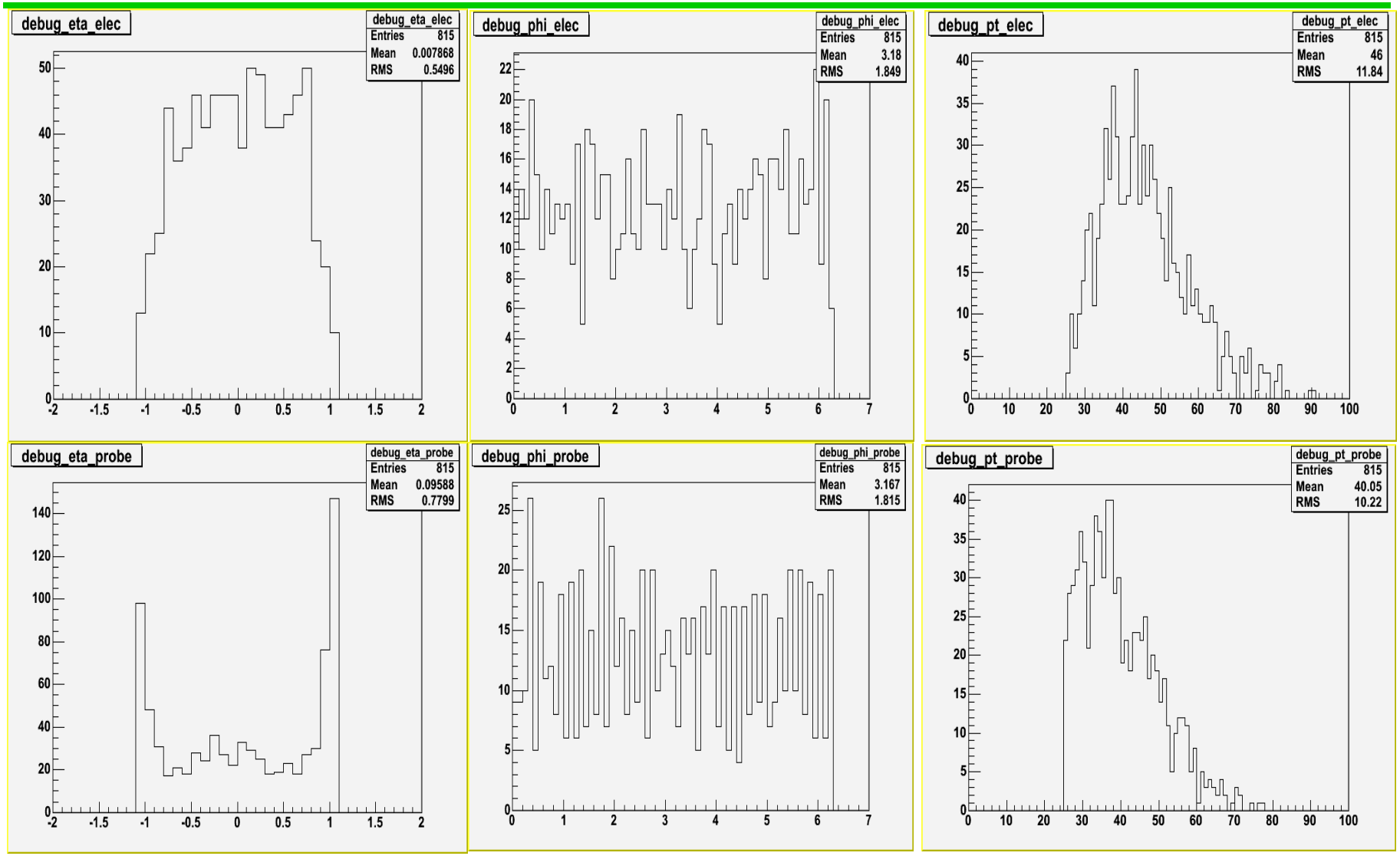

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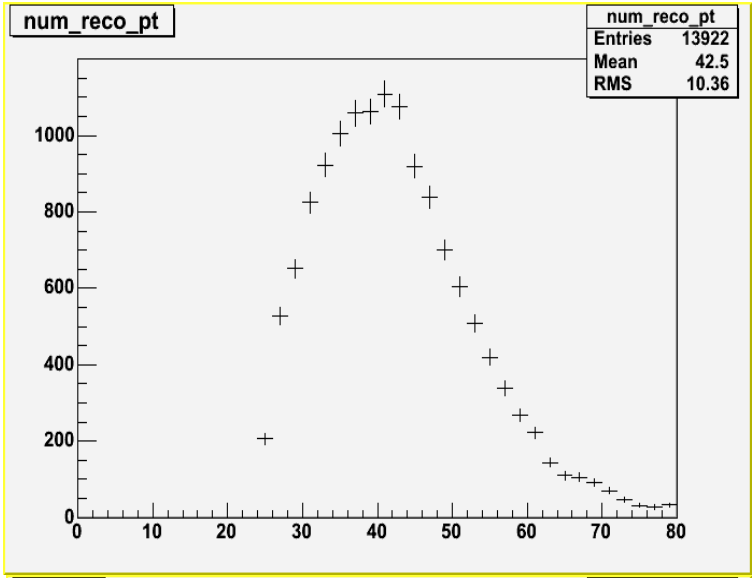

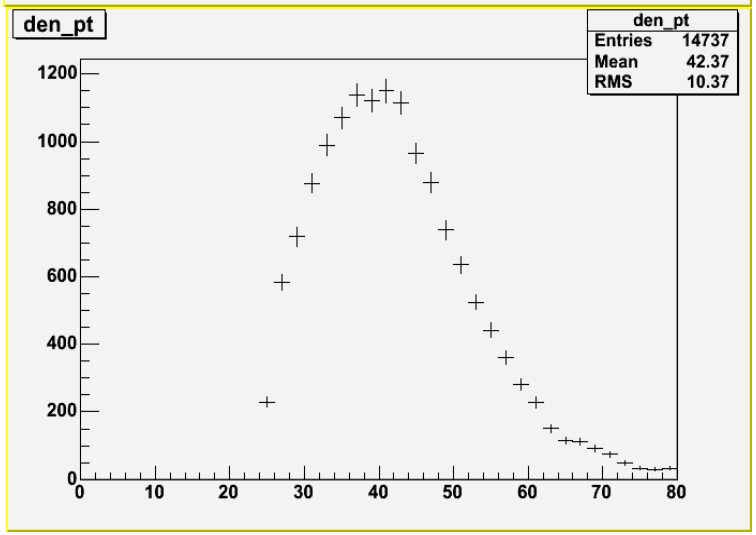

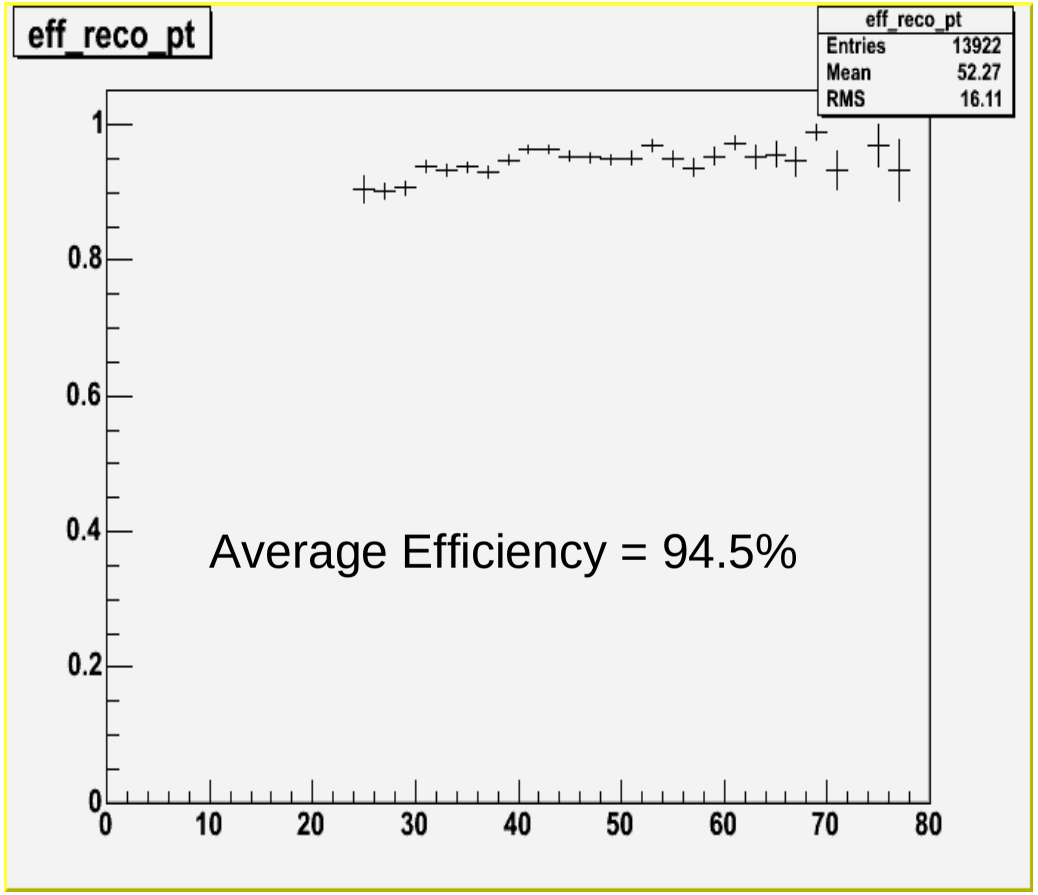

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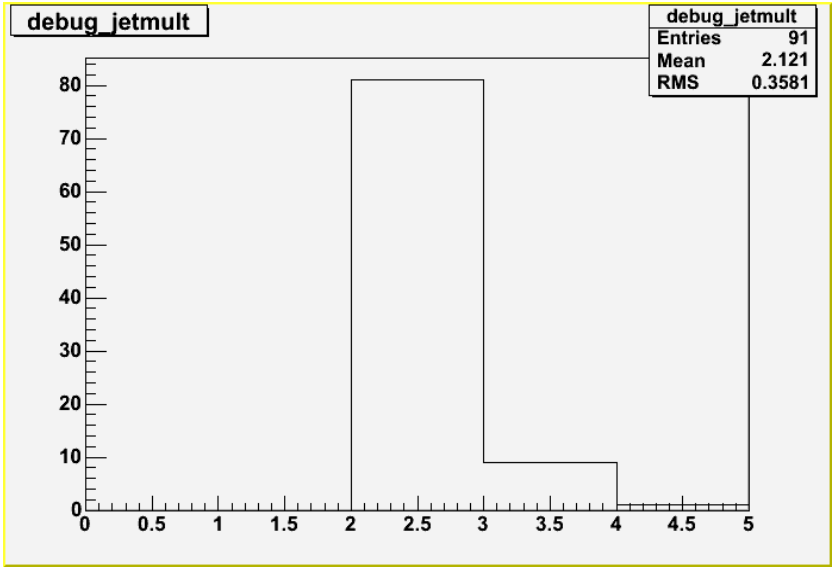

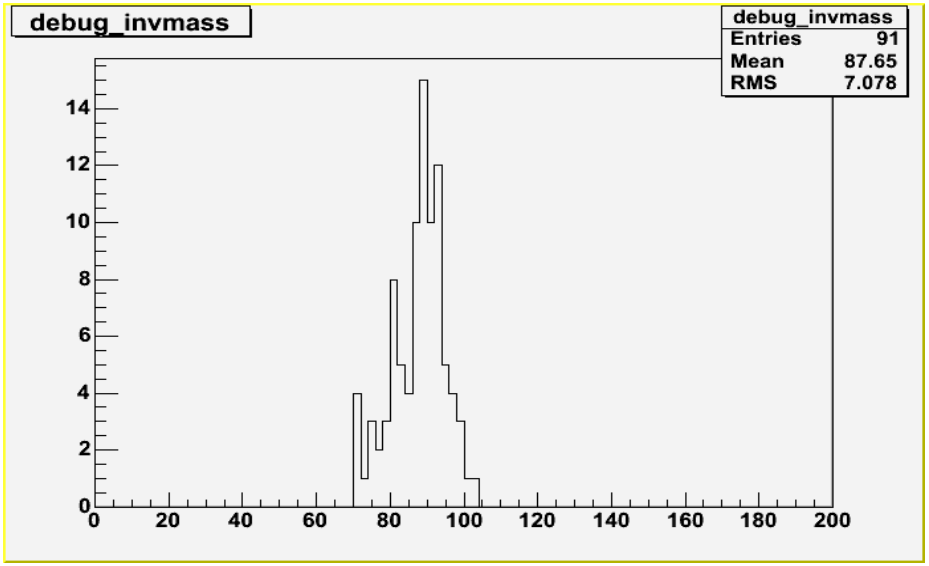

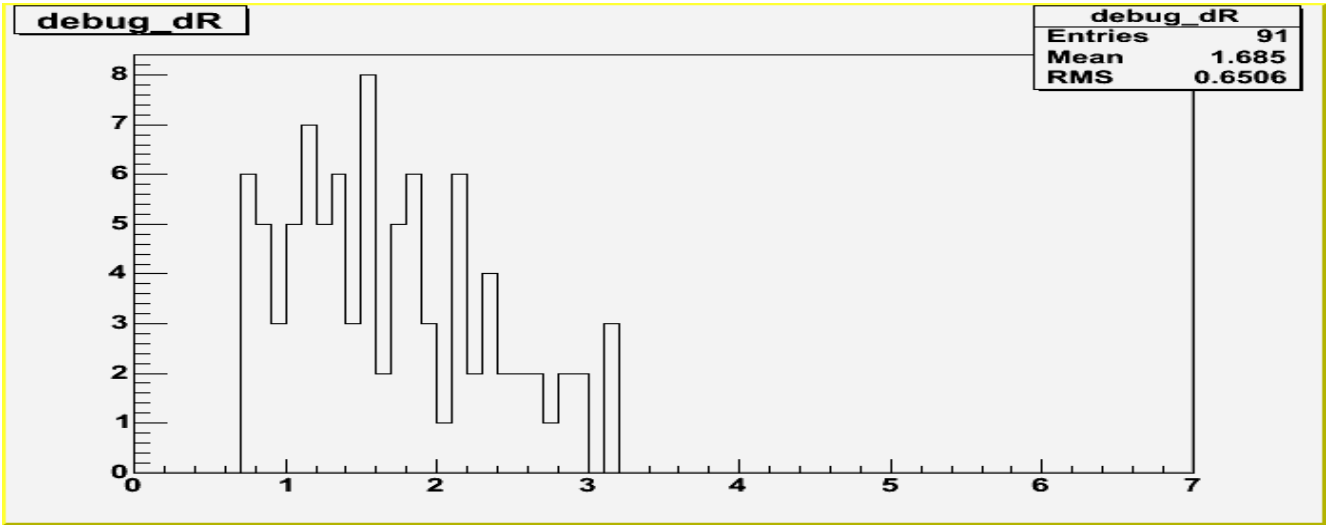

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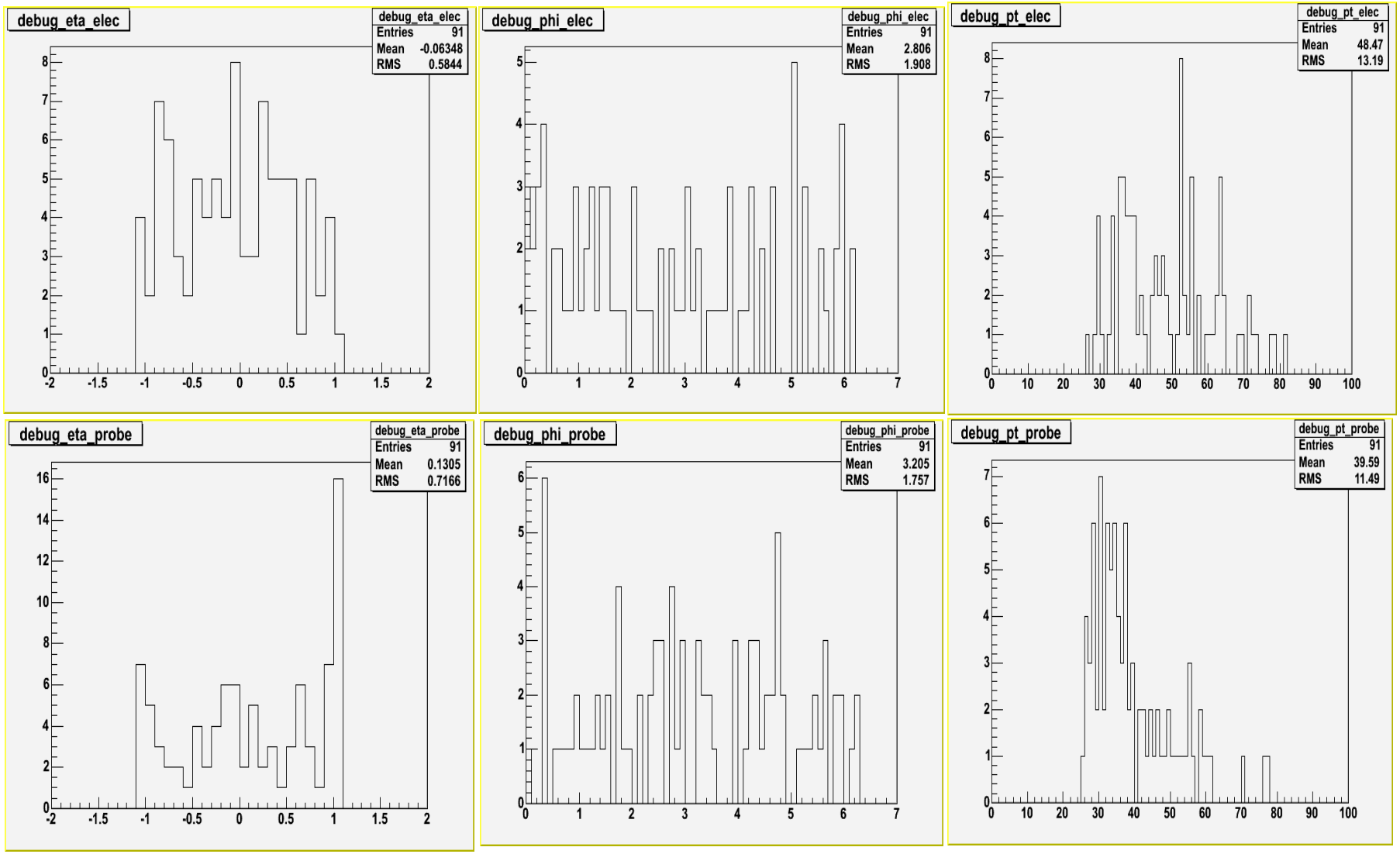

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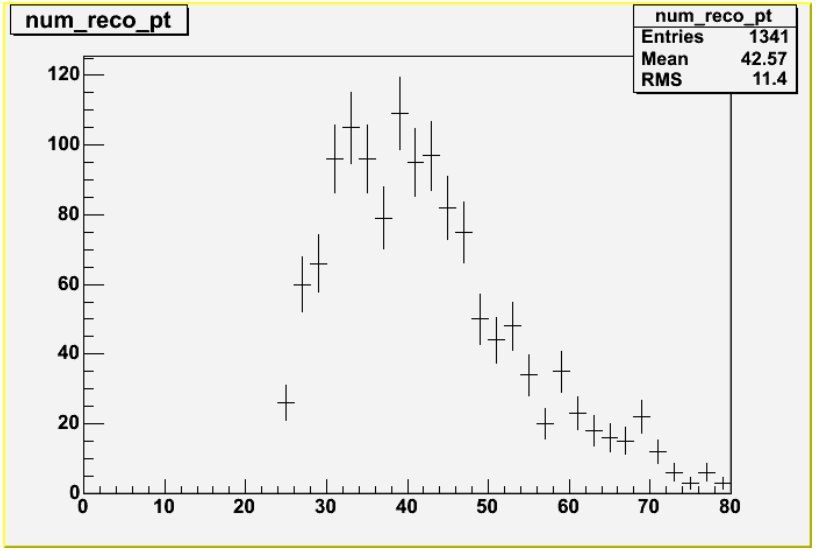

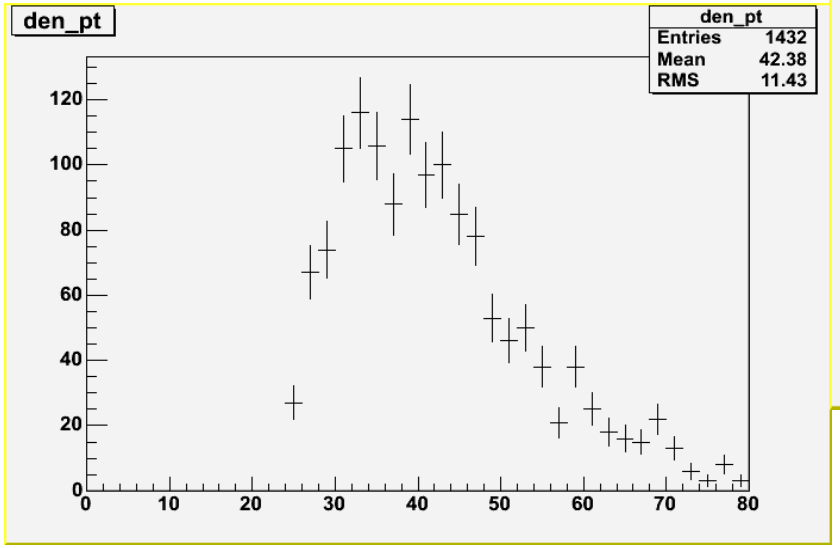

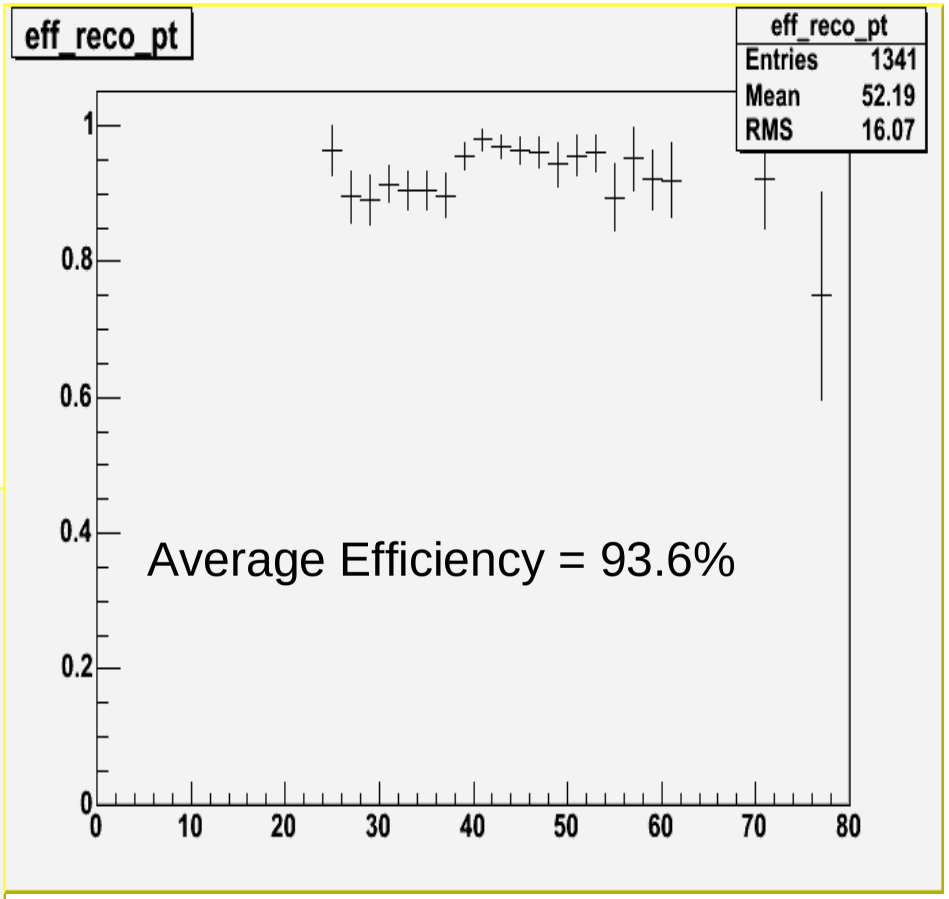

Some comments ...

I'm a little worried about the probe track pT distributions in data. They don't look signal like at all (steeply falling type of spectrum). On the other hand the diem invariant mass distributions look like signal.
Still not sure what to make of this ...

Also checkout the probe tracks eta distributions in MC. Looks like something funny is happening near the ICR.