Status of the Study of the L2 Isolation Cut

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Can Study a Central EM Trigger with QCD Events

- Central EM Trigger
  - (L1) CEM(1,10) CER(1,5,C)
    - One EM tower with 10 GeV and one EM tower with 5GeV in the central region (–1.1<eta<1.1)
  - (L2) L2EM(1,10,s,fp)
    - One EM object with 10 GeV plus cps match and emfraction cut
- SAM Dataset Definition
  - Use a sample from SAM whose contents are unknown(thought they were QCD events pt>10, minbias 0.7)
    - vz–tsim–pt10–mb0.7 (~60k events)
  - Will run root script again on proper dataset when it appears
- Use d0trigsim version p06.00.01 with slight modifications in L2 global code and L2CPS worker code and addition of L2 CPS analyze package

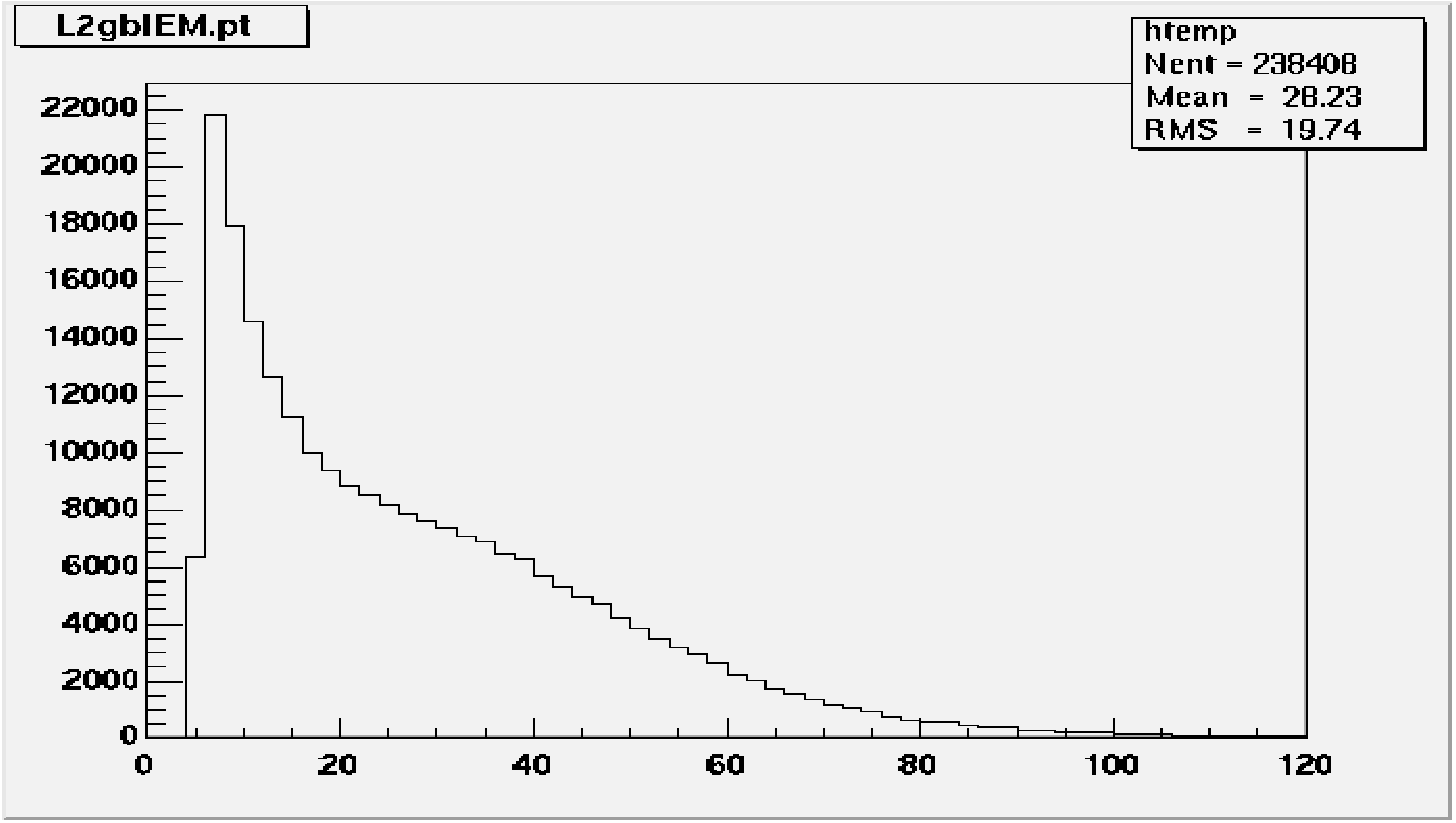
Use Reasonable Cut Values

- Cut values
  - Emfraction > 0.9 (from study by Marc Buehler)
  - CPS match window +/– 1 bin in eta, phi
- Trigger Definition from Andre defines L1 cuts

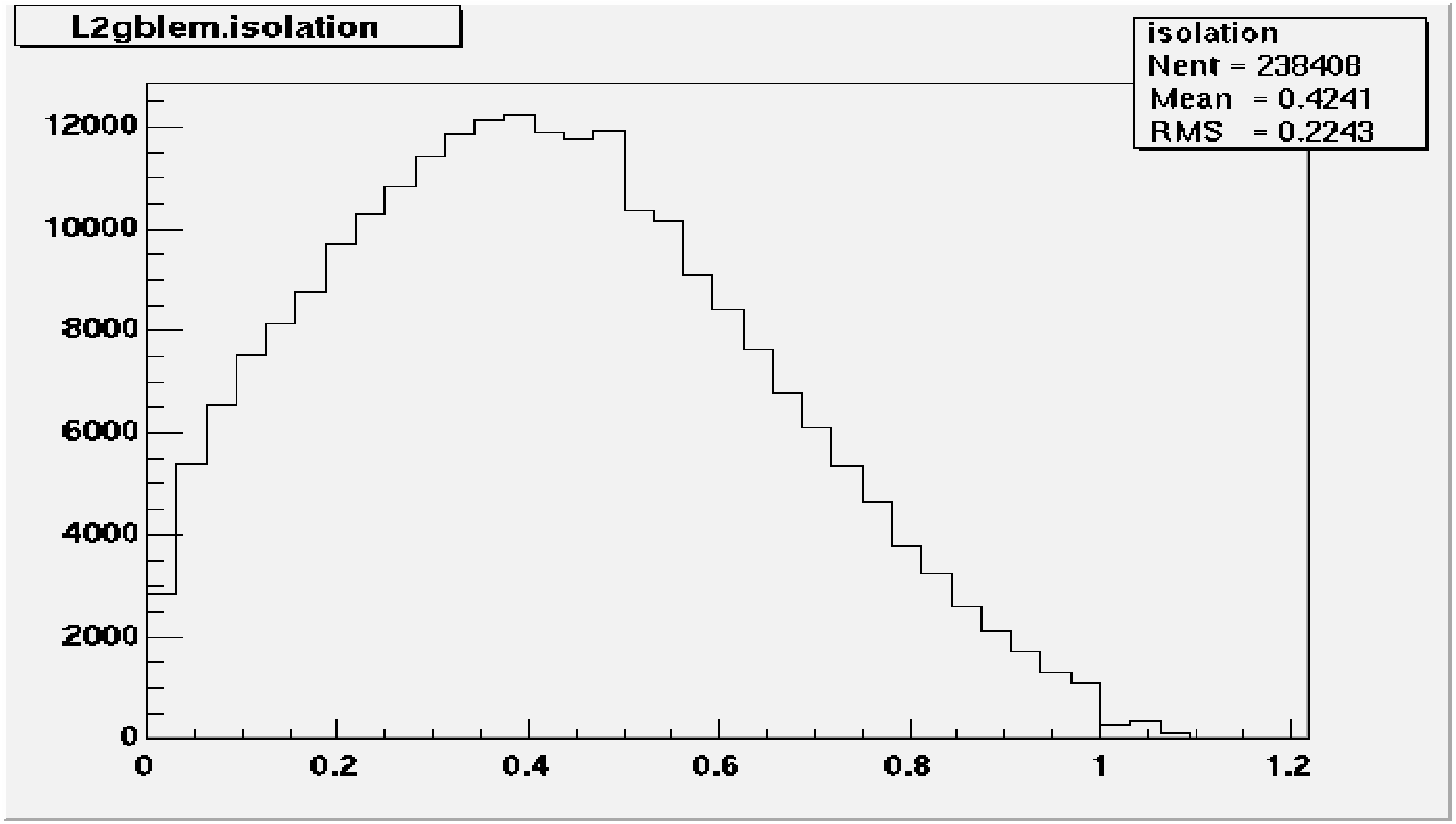
L2 Global Plots Before Cuts

- P_T Distribution of EM objects before cut at 10 GeV follows
- Isolation Fraction of EM Objects follows
- EMFraction of EMObjects before cut 0f 0.9 follows

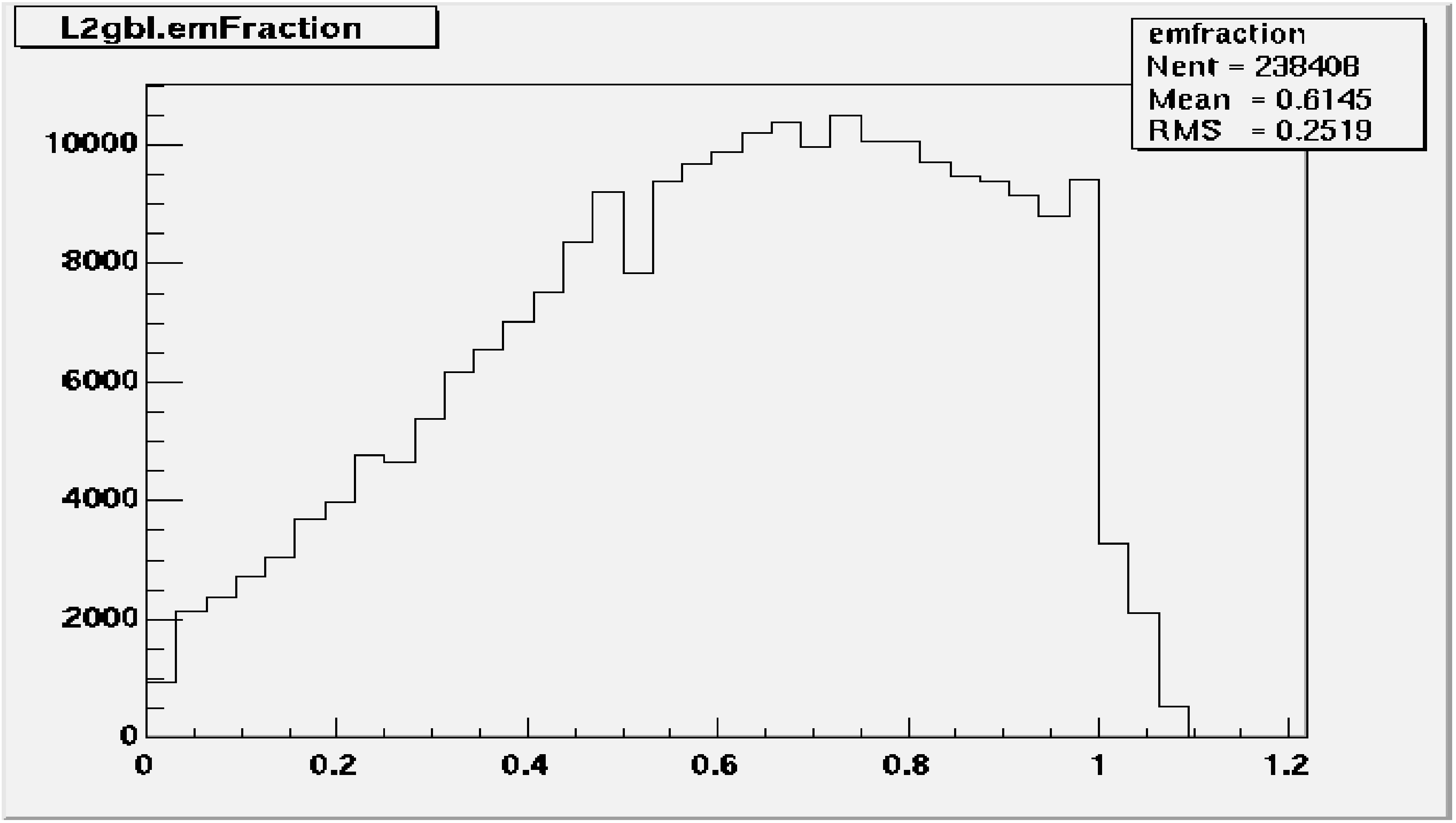
P_T Distribution



Isolation Distribution



EMFraction



L2gbl.emFraction
emfraction
Nent = 238408
Mean = 0.6145
RMS = 0.2519
10000
8000
6000
4000
2000
0
0
0.2
0.4
0.6
0.8
1
1.2

Rate Calculation

- $L = 2.5 \times 10^{31} cm^{-2} s^{-1}$
- Cross section
  - Based on what the dataset was thought to contain(but did not!)
  - c.s. = 538×10^{-6} b (WRONG!)
- Rate = L * c.s. * f
  - f is the fraction of events passing
- Report survival fraction after each cut as well

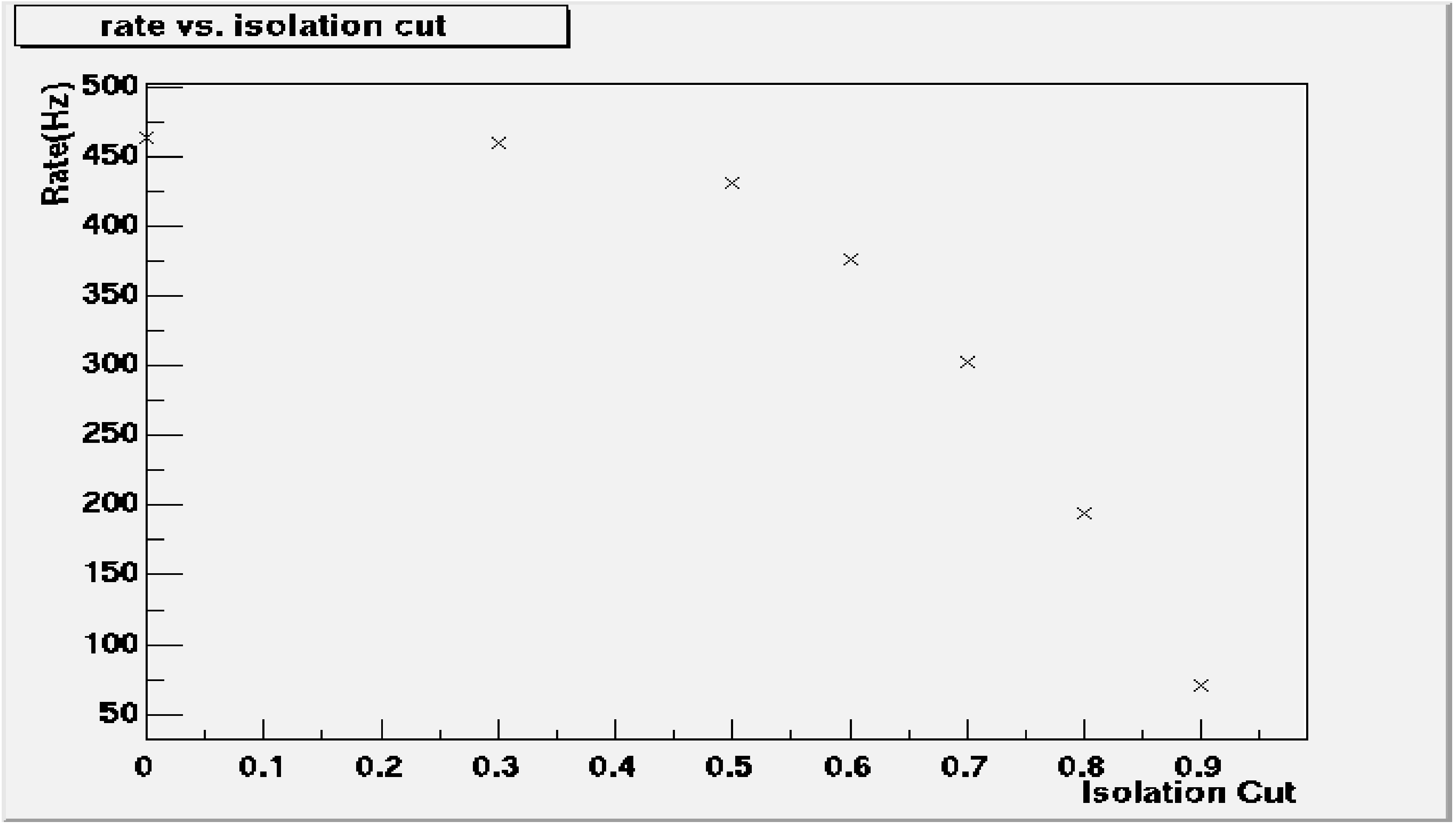
Statistics

- Number of events= 59994
- Total number of events passing
  - CEM term alone = 51255 (survival fraction = 0.85)
  - CER term alone = 37774 (0.63)
  - L1 term (CEM + CER) = 33579 (0.56)
  - Emfrac > 0.9 = 2828 (0.047)
  - P_T Cut > 10 GeV = 2066 (0.034)
  - Iso > 0.5 = 1923 (0.032)
  - Iso > 0.8 = 867 (0.014)

Total Rate

- L1 pass Rate= 7528 Hz
- Total Rate for trigger with no iso cut= 463 Hz
- Rates at various isolation cuts
  - Total Rate at iso cut of 0.5 = 431Hz
  - Total Rate at iso cut of 0.6 = 376Hz
  - Total Rate at iso cut of 0.7 = 303Hz
  - Total Rate at iso cut of 0.8 = 194Hz
  - Total Rate at iso cut of 0.9 = 71Hz
- Rate (iso cut>0.8) / Rate (no iso cut) = 0.42

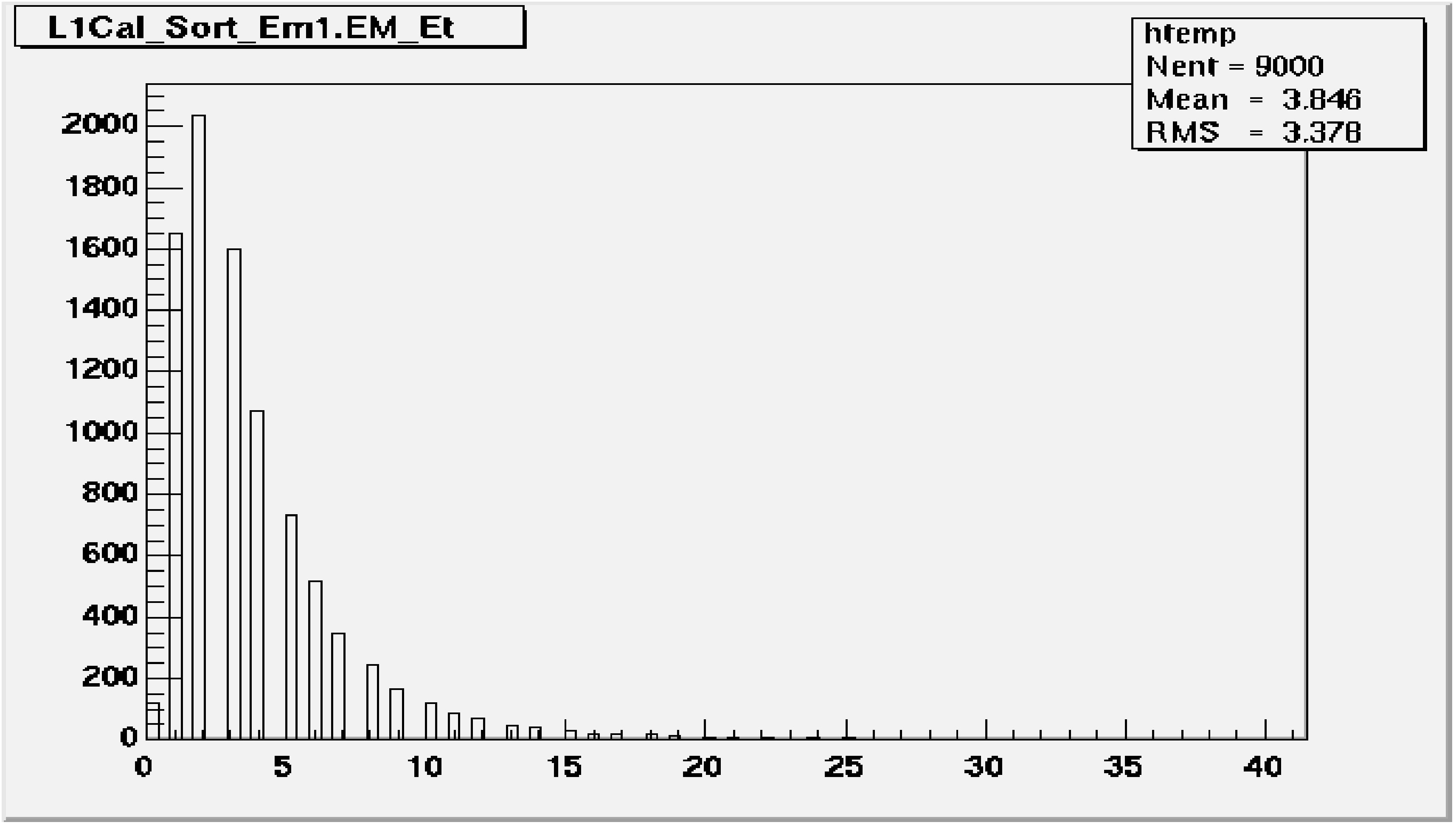
Rate vs. Isolation Cut



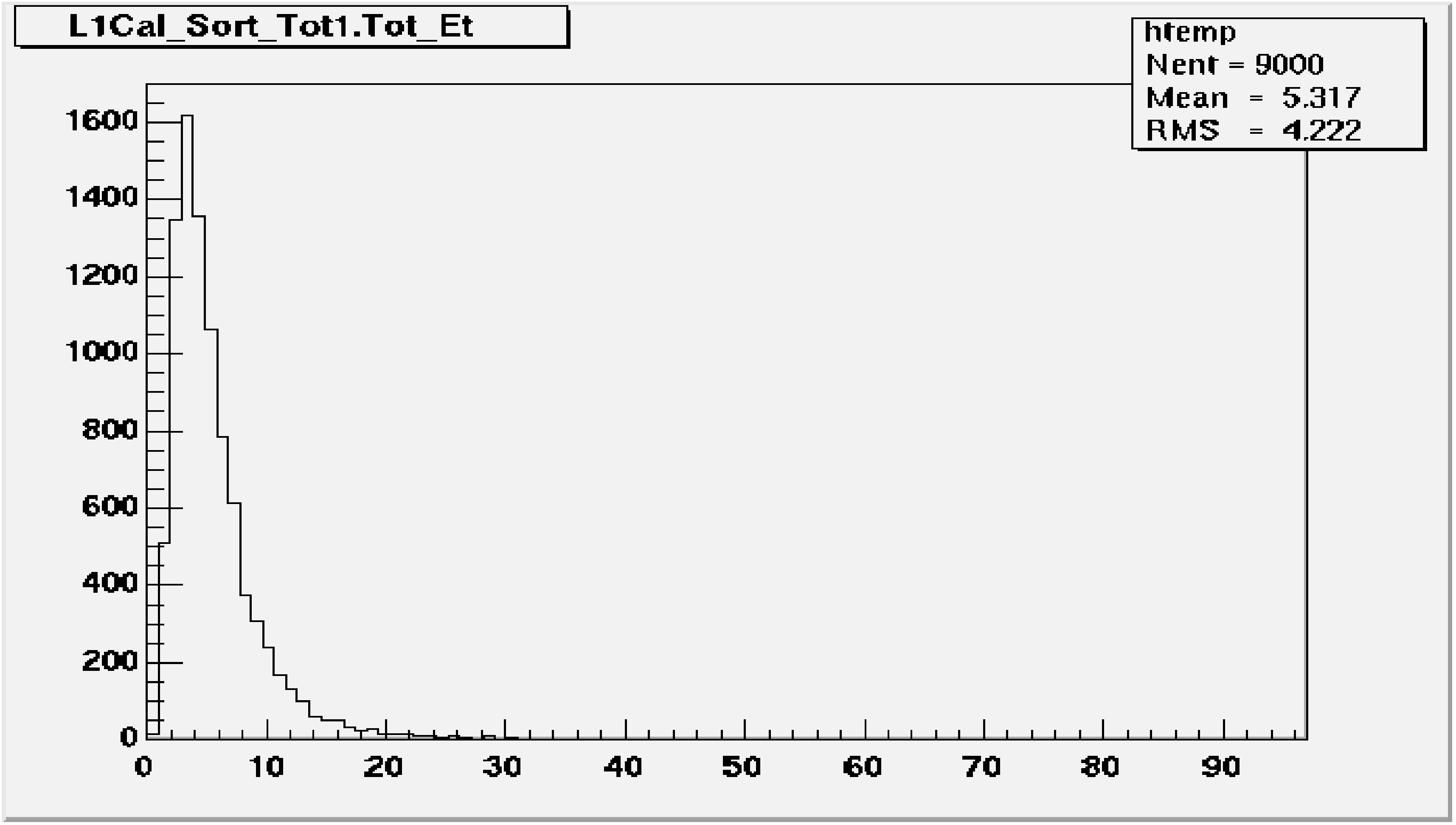
Repeat with a (small) good dataset

- 9000 QCD events with $P_T > 20$ GeV
- L1 Plots from root output follow
- Rate vs. Isolation Cut plot for the Central EM (combined L1,L2) trigger follows

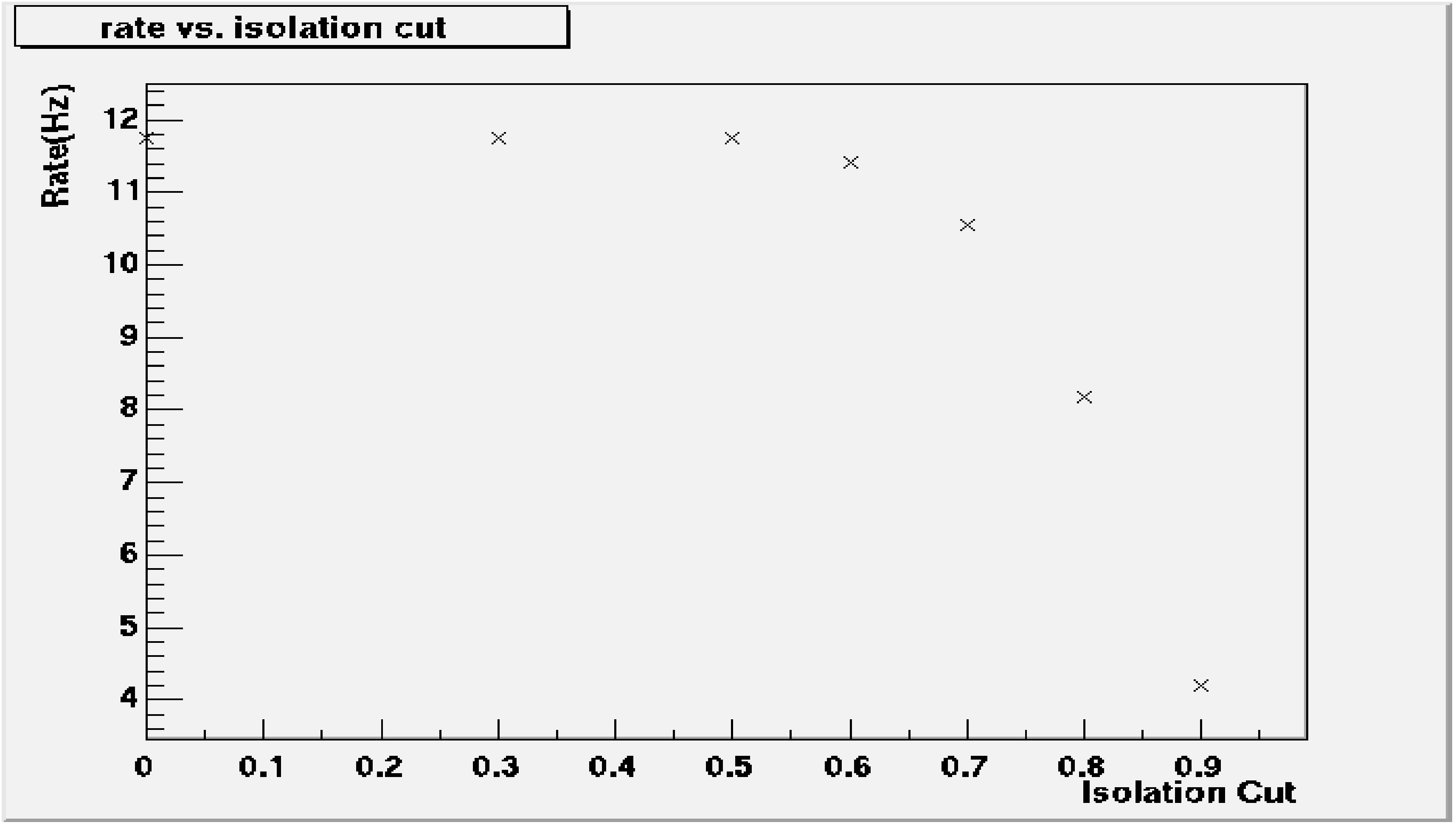
L1 Plots
QCD $P_T > 20$



L1 Plots
QCD $P_T > 20$



Rate vs. Isolation Cut
QCD $P_T > 20$



Future

- Run d0trigsim with correct dataset
- Investigate global algorithm
  - Study global algorithms more before studying ioslation cut? (suggestion from Nikos after EMID meeting)
- Incite the tuning of the l2 algorithms