Missing Et trigger at low luminosity

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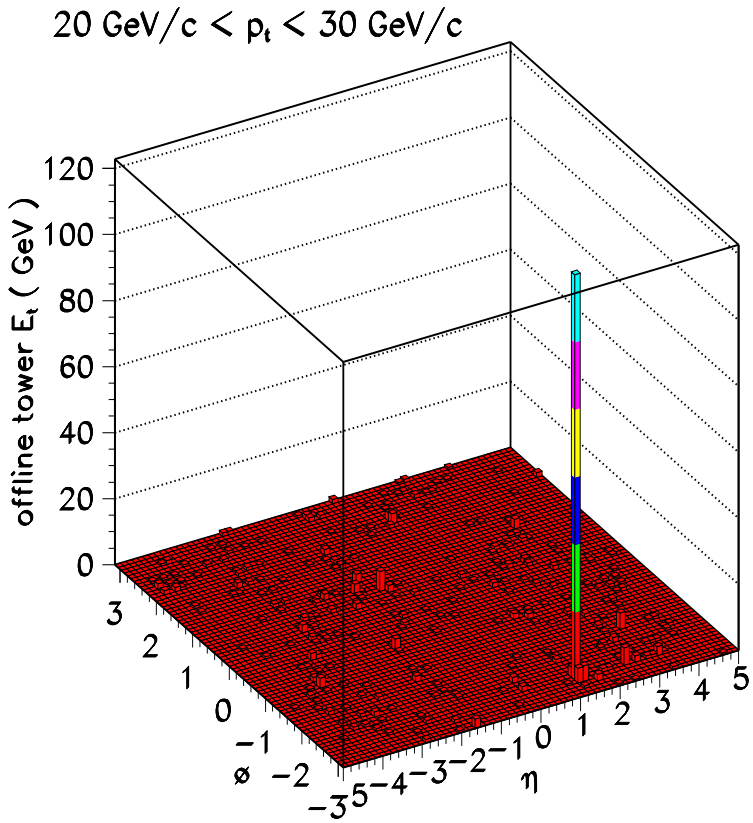
Issue

- **ILOSS bug and curing it**
- **low luminosity rates**
  - **2*10^33 cm^−2 s^−1, ~3.47 pile−up**
  - **pure met**
    - generated + level 1 + level 2 (uncorrected + corrected)
  - **1 jet + met**
    - generated + level 2
  - **triggering invisible Higgs (120 GeV/c)**

ILOSS bug

HCAL
JET
MET



- big individual tower
  - in big statistics bins
- to cure it
  - reproduction is the final cure
  - but I have tried some cuts
    - A : Met/sqrt(pthat)
    - B : Et_tower/Et_jet
    - C : Et_tower/ Et_"3x3"
    - D : dR(Met,Et_tower)
  - "A" works very well

Missing Et / Pthat**2

HCAL
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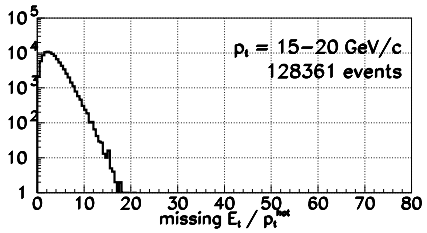
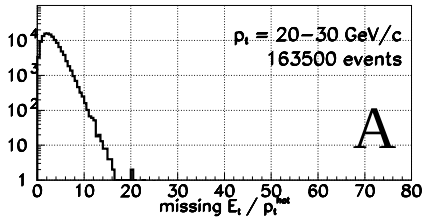
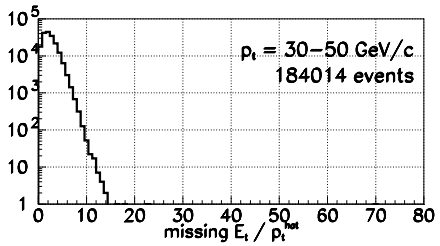
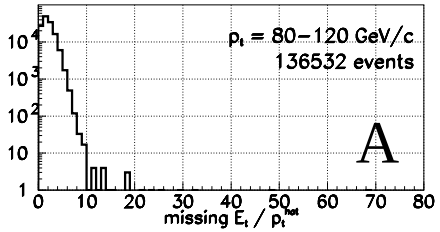
MET









- cut "A"
- missing Et / sqrt(pt_hat)
- scaling behaviour is apparent
  - with some restrictions :
    - statistics is different in bins
    - for lower pthat there is fast turn on
- cut chosen
  - met/sqrt(pthat) < 17, if pthat > 10 GeV
    - may be a bit strong but effective

Some cuts

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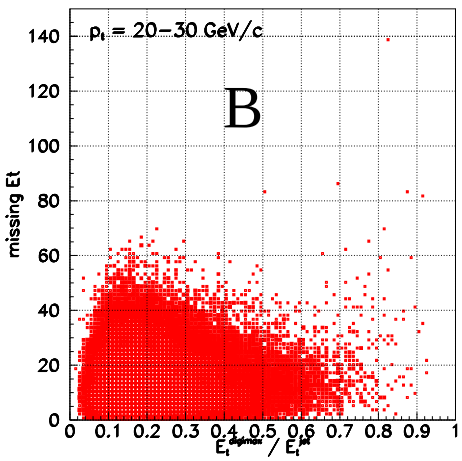
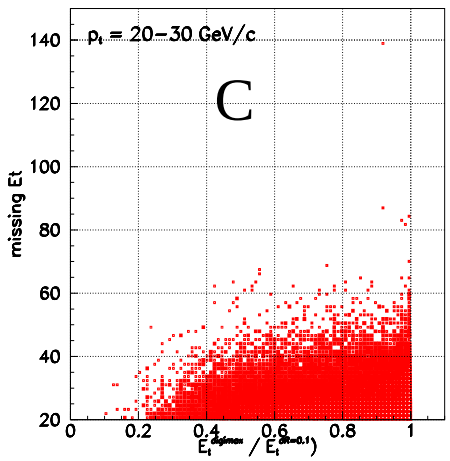
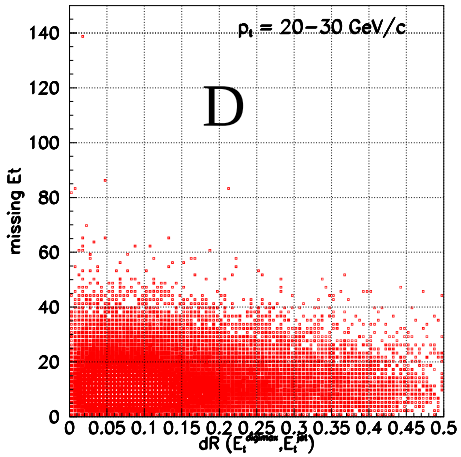
MET

- cut "B" – Et_tower/Et_jet –example cut at 0.75
- cut "C" – Et_tower/ Et_"3x3"(narrow "B")
- cut "D" – dR(Met,Et_tower)
- they seem to be very dangerouos
  - they cut in the bulk of events (C, D)
  - they are not very effective (B)







Generated & L1 Met

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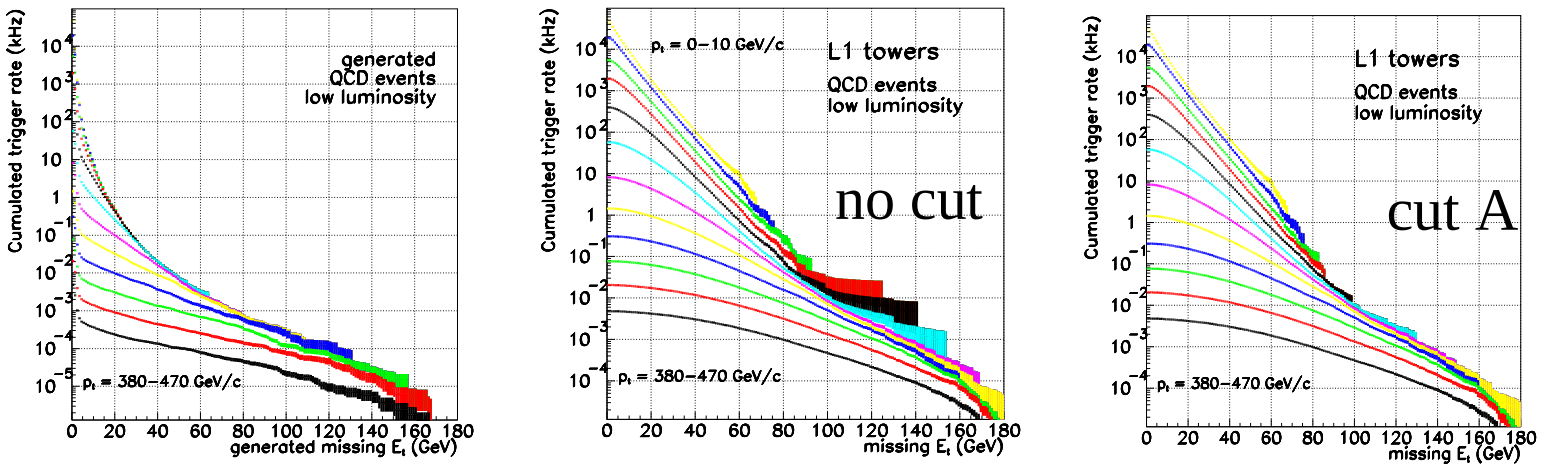
JET
MET

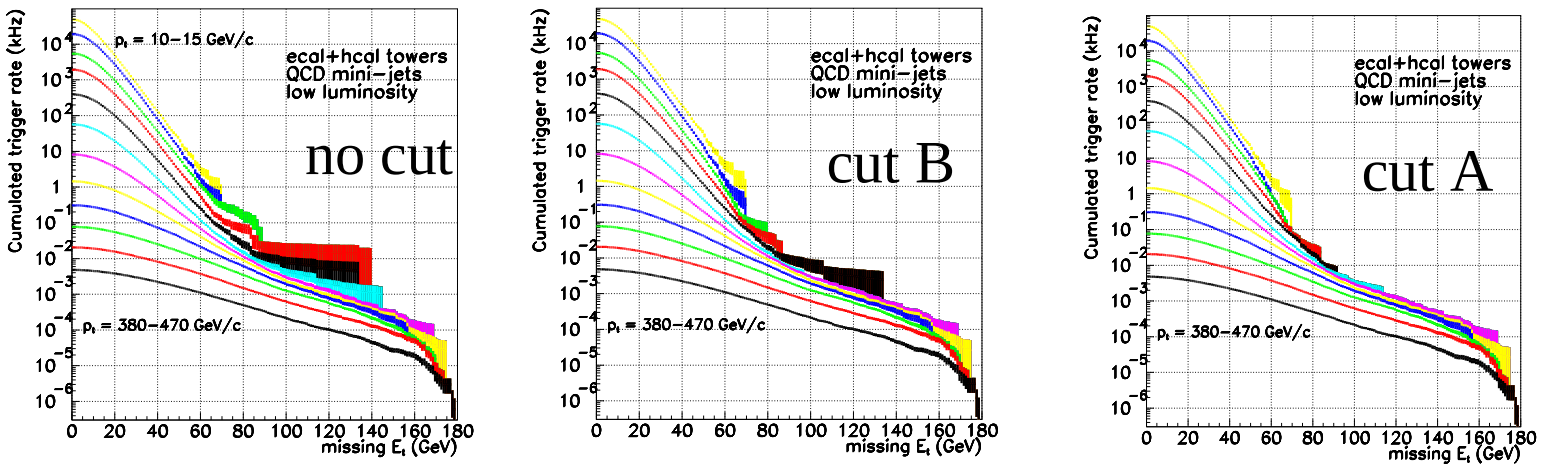
- no correct (Branson−Trepagnier) weights yet
  - reproduction is going on (Yujun)
- 1 Hz quota for pure met
  - generated at 80 GeV
  - Level 1 at 135 GeV
  - cut A → ugly tail fluctuation is gone



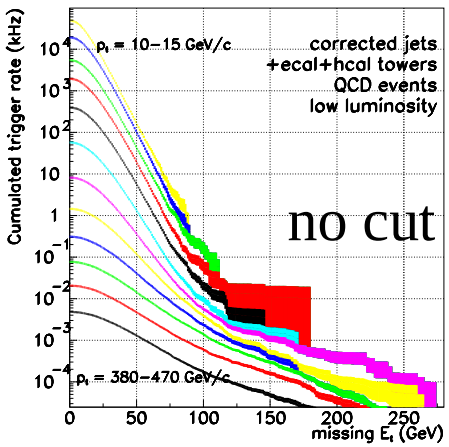
Level 2.0 missing Et

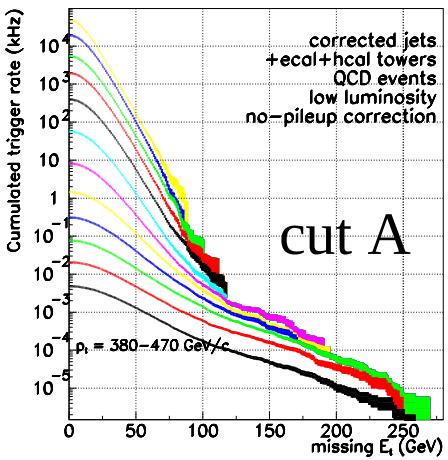
HCAL
JET
MET

- cut A (Met/sqrt(pthat) < 17.) is the best for rates
- 1 Hz is at about 125 GeV
  - better then Level 1



Level 2.2 missing Et





- jet + out–of–cone constituent correction
  - jet Et > 30 GeV
  - tower as if 30 GeV jet
- after correction
  - puts the average met to 0
    - we need it for neutrino reconstruction
  - makes sigma worse
    - detector resolution dominates missing Et resolution, not response
- 1 Hz is at about 140 GeV
  - slightly worse than Level 1
  - worse than Level 2.0
  - but it is real

Level 2.0 met + 1 jet

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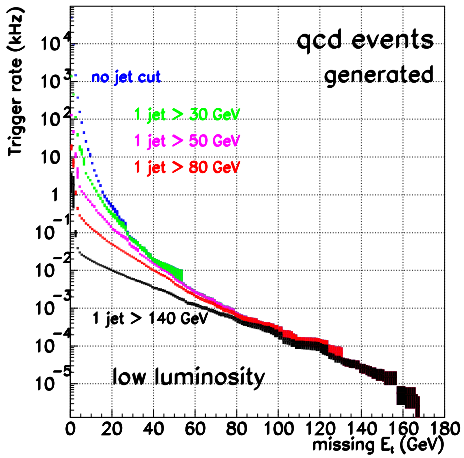
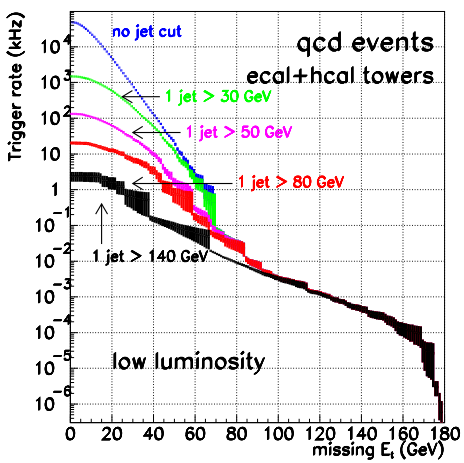
JET
MET

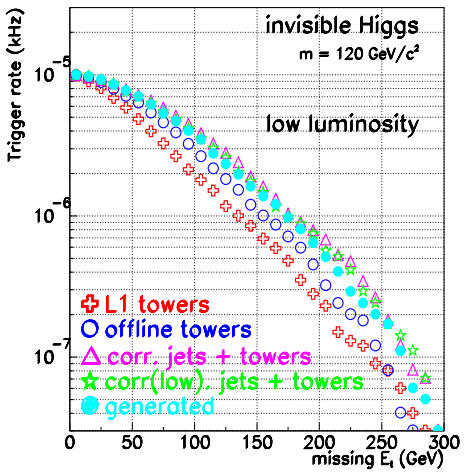


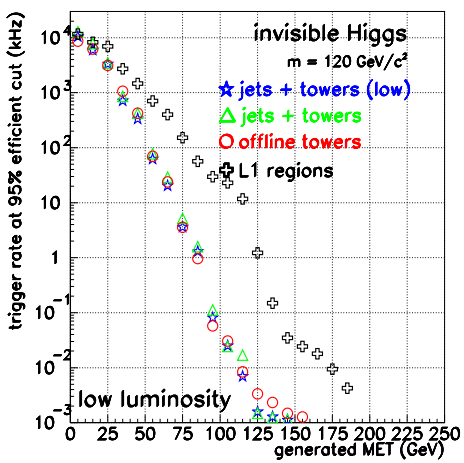


- 1 jet reduces the rate at low met
- 100 GeV is a turning point ?
  - below is it resolution (fake met)?
  - above is it physics (real met)?
  - jet+ met rate becomes pure met rate
- 1 Hz is at about 125 GeV
  - cut A
  - same as pure met
  - 2 jet + met is forcoming

Invisible Higgs (120 GeV)

HCAL
JET
MET





- bulletin (CMS week, Sep 2001)
  - with generated quantities
  - 100 GeV met + 1 jet > 40 GeV
  - 95 % efficiency
- orca study
    - is it the same channel ? (qqH->ZZ)
  - at 100 GeV
    - L2 & Gen < 40 % absolut efficiency
    - L1 < 10 % absolut efficiency
    - 1 extra jet is all the same
      - or other backgrounds ?
- L2 trigger is possible at 100 GeV
  - must be exclusive (~ 80 Hz backgr.)
  - ~ 95 * 40 % = 38 % absolut efficiency