Anomalous Spike in Jet Trigger Rates

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HCAL DPGDetDiag / DQM Meeting
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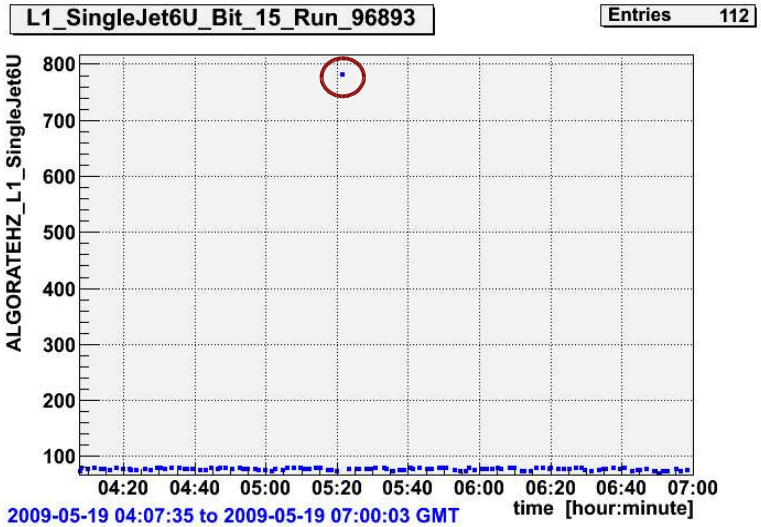
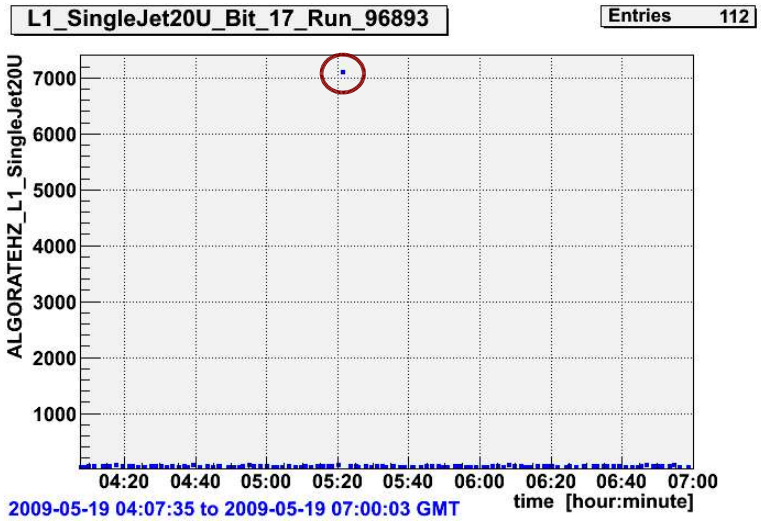
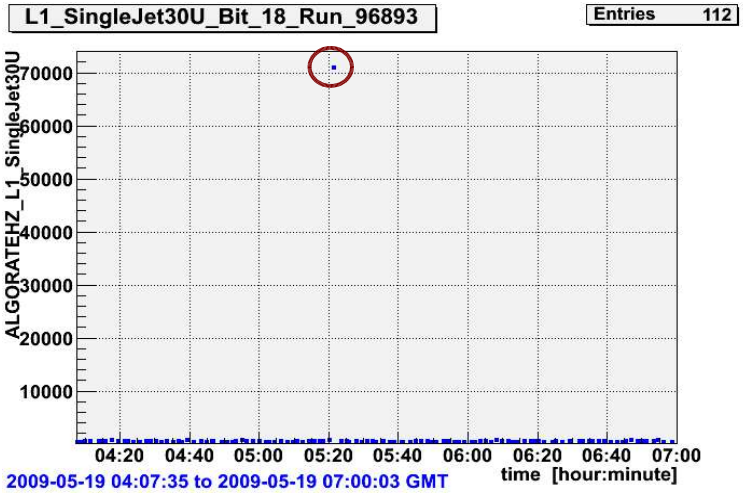
L1 Jet Trigger Rates for R96893







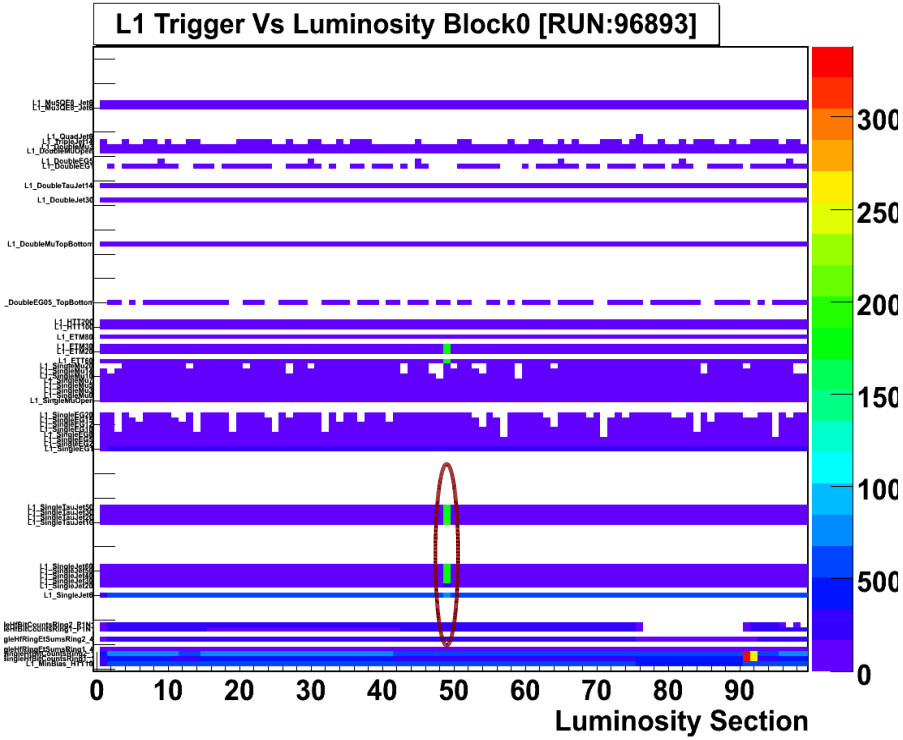
For R96893, a spike was observed in L1 Jet Trigger rates at only one Lumi section.

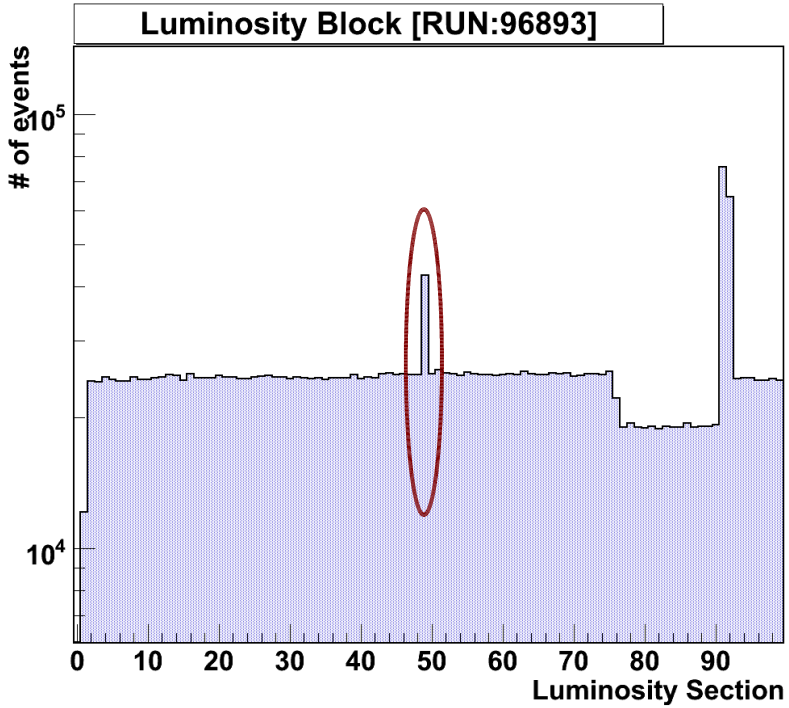
What is the reason of this spike?

Analysis

- Run Number is 96893 (MWGR 21)
- CMSSW_2_2_11
- Calo/Commissioning09-PromptReco-v1/RECO data set
- Iterative Cone R=0.5 as jet finding algorithm
- Jet Triggers
  - L1bit 15 => Single Jet 6 GeV, prescale factor is 100
  - L1 bit 17 => Single Jet 20 GeV, prescale factor is 10
  - L1 bit 18 => Single Jet 30 GeV, prescale factor is 1.

HCAL Trigger Monitor

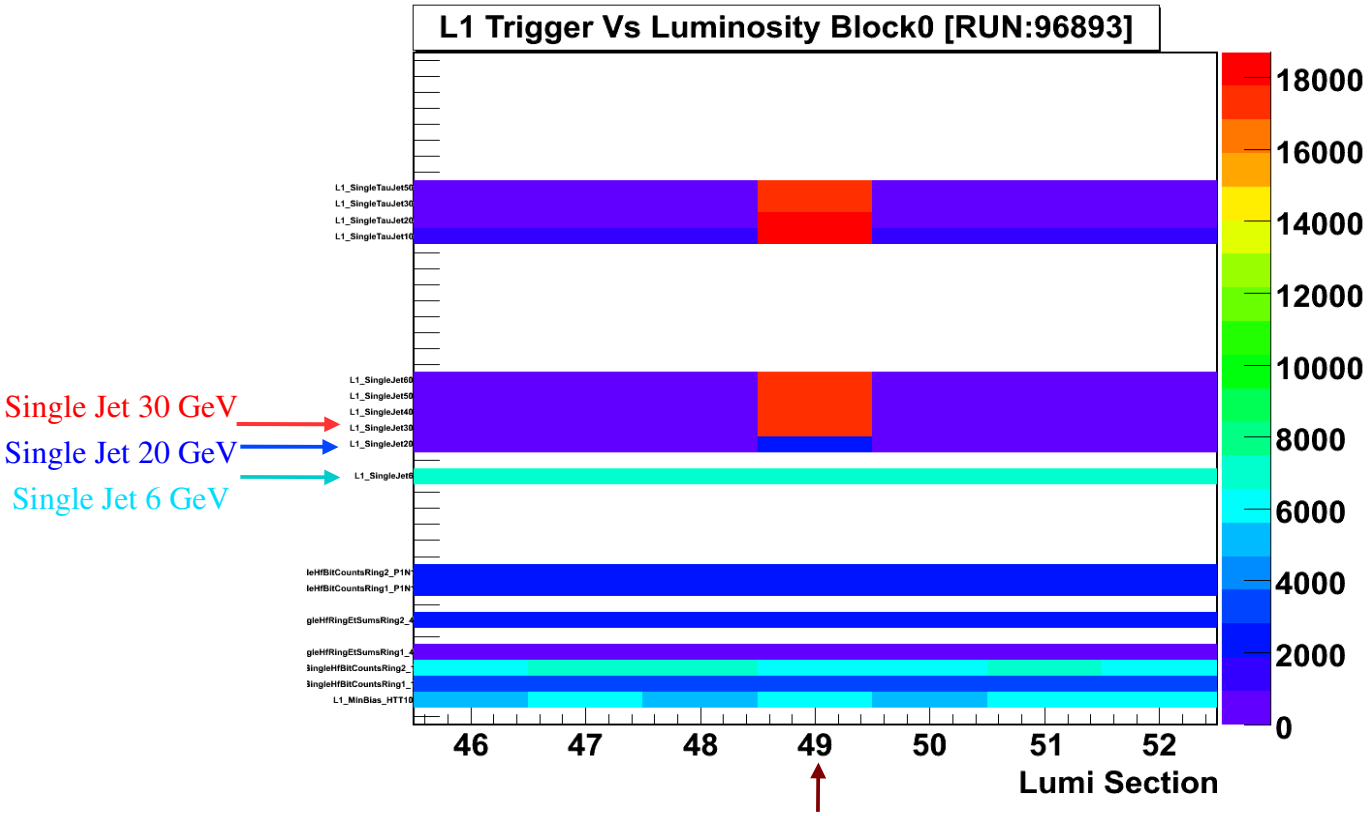




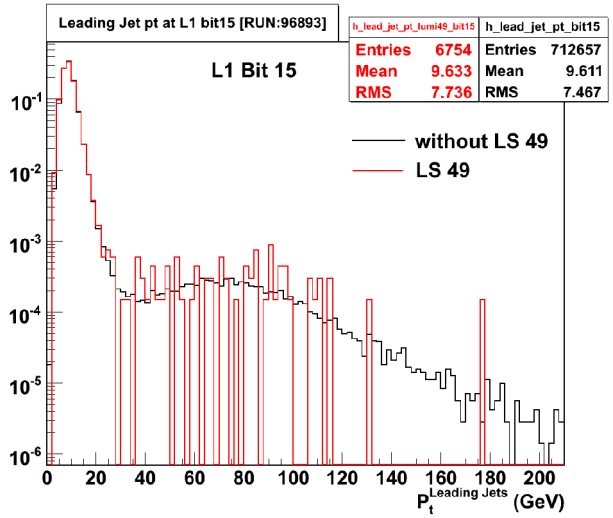
- HcalTrigMon is available in CVS.
  UserCode/HcalRocFnal/Analysis/HcalTrigMon
- Anomalous jet trigger rates is coming from lumi section 49.

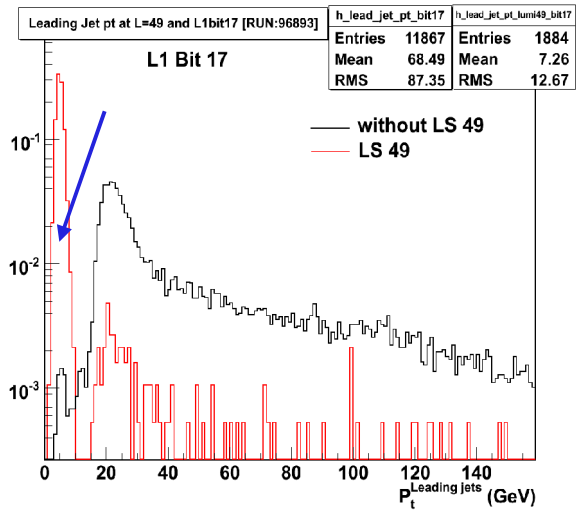
L1 Trigger Rates vs Lumi Section

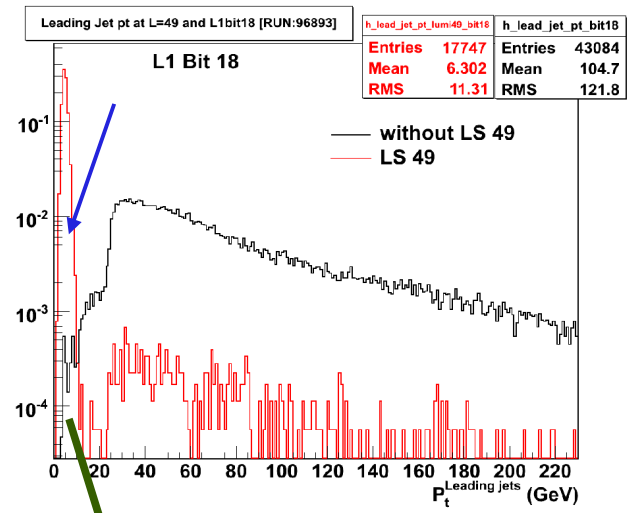
- There is no spike for L1 SingleJet 6GeV.
- The Trigger rate at L1 SingleJet 20GeV is almost 10 times grater than L1 SingleJet 30GeV.

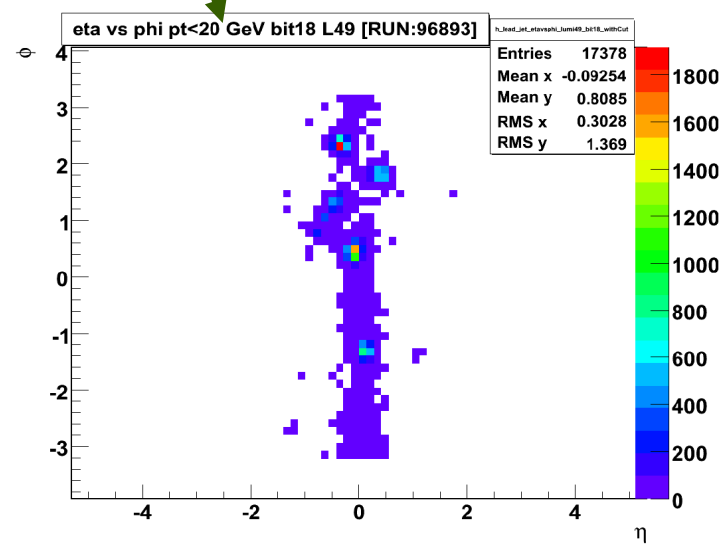


Leading Jets



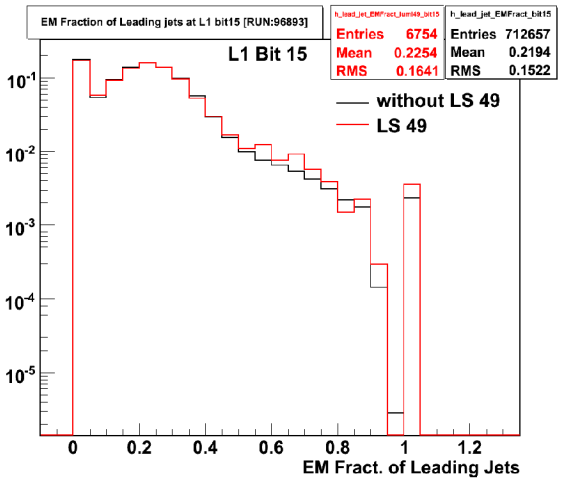


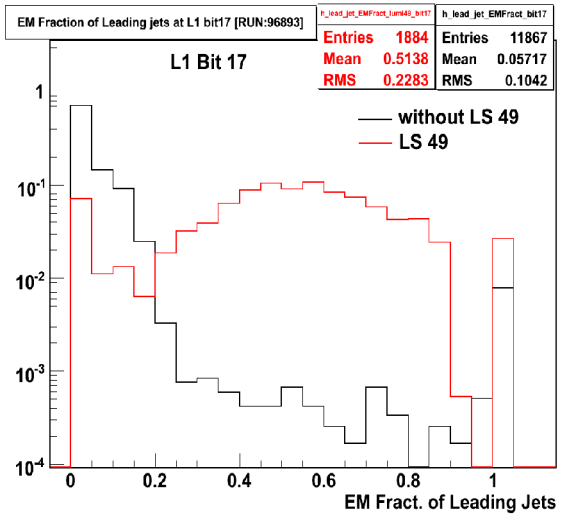


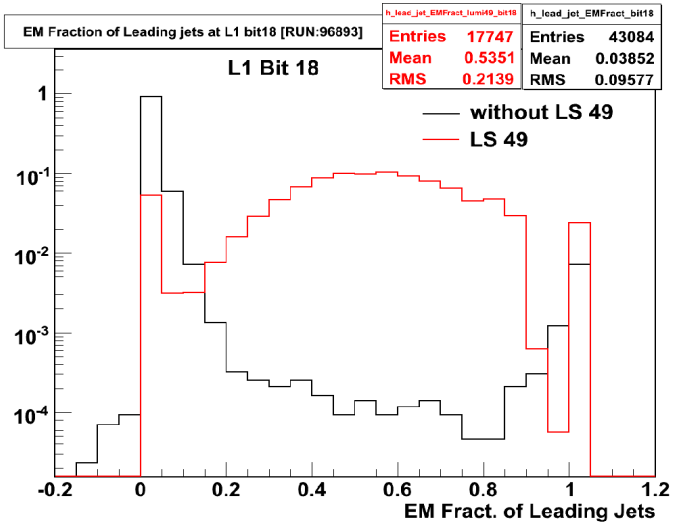


- There is an abnormal pick at leading jet distribution for L1 bit 17 and L1 bit 18.
  - These jets are not matching L1 Jets. These are not real jet. We called them “Small pedestal jets”.

EM Fraction of Leading Jets



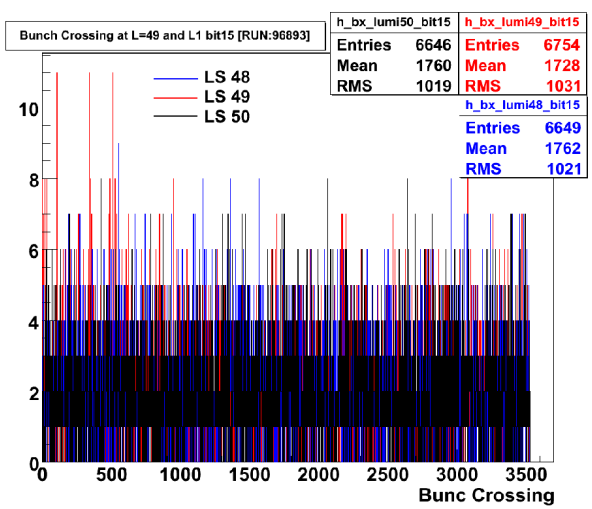


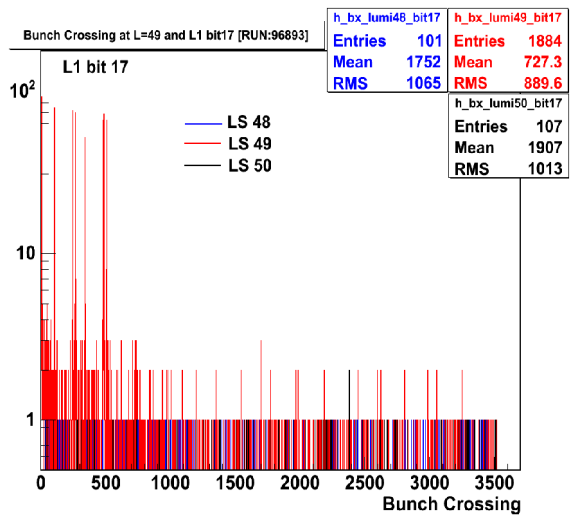


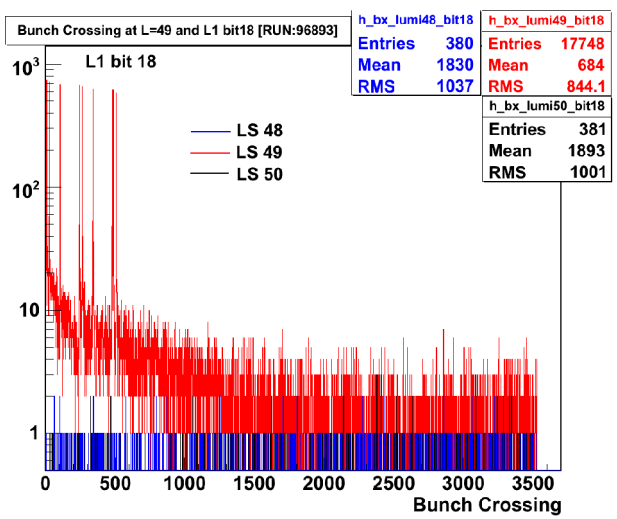
- EM Fraction of leading jets increased for L1 bit 17 and L1 bit 18.
- Dominated by “Small pedestal jets”.

Bunch Crossing Rate

- There is no change in BX rates for L1 bit 15.
- BX rates significantly increased for L1 bit 17 and L1 bit 18.
  - The increment for L1 bit 18 is much more significant than L1 bit 17.

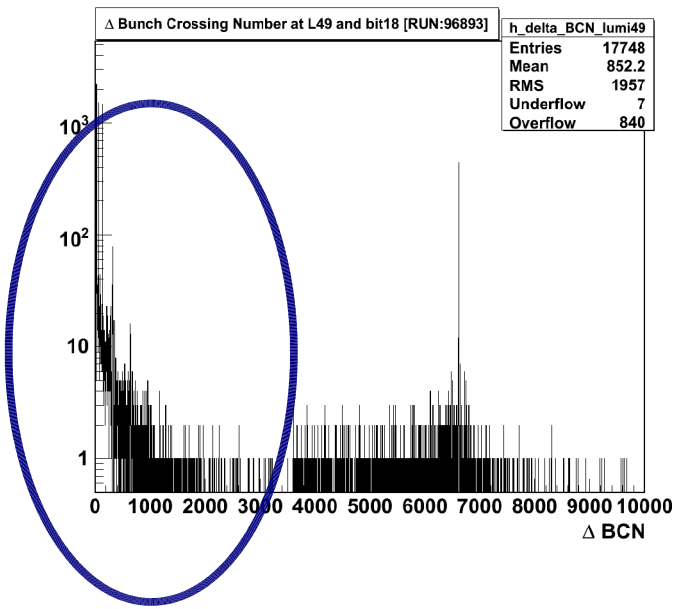


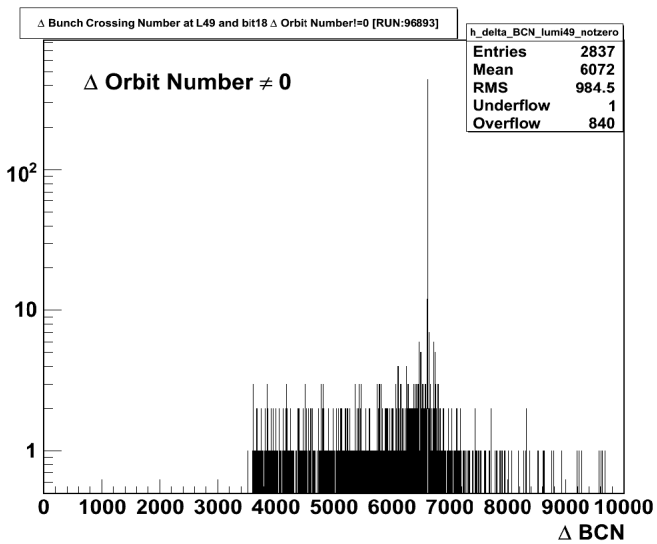




Bunch Crossing Number at LS 49

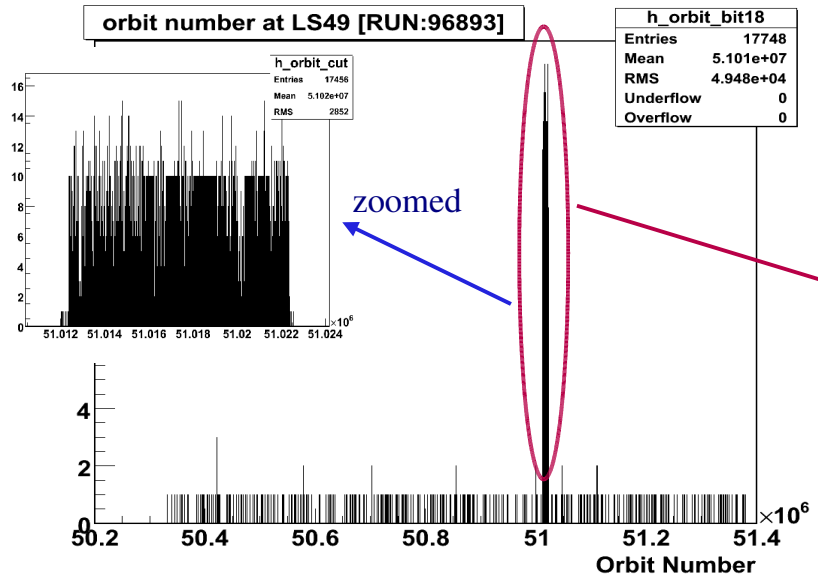
- Generetad every N orbits?
  - Delta BCN = OrbitBunchCrossingN(i+1) – OrbitBunchCrossingN(i)
    - OrbitBunchCrossingN = OrbitN*3564 + BunchCrossingN

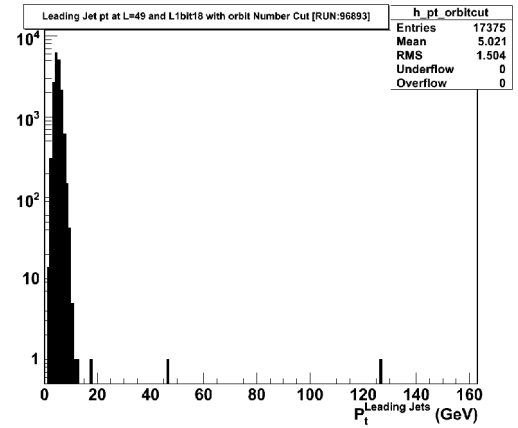


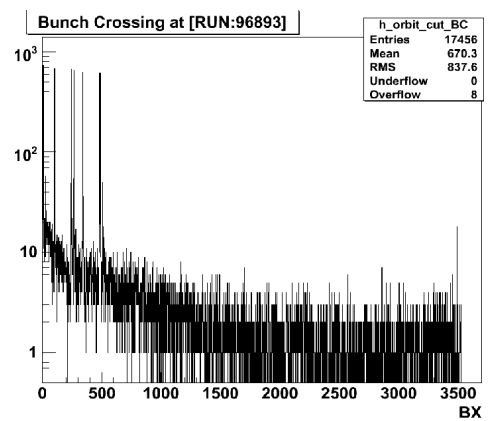


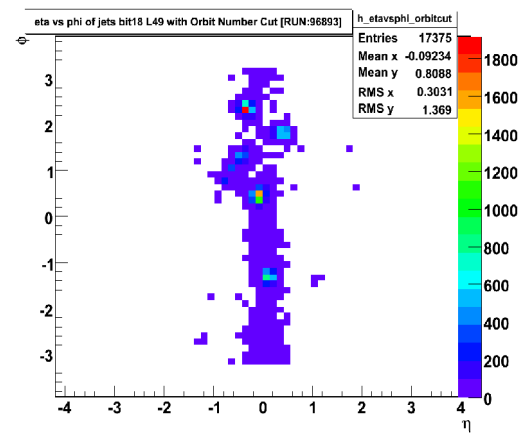
- After applying a cut as Δorbit Number ≠0, the first part disappear.
- These events are in the same orbit numbers.

Orbit Numbers at LS 49









- The spikes in Orbit Numbers at lumi section 49 created all anomalous "small pedestal jets" for L1 bit 18 and L1 bit 17.

Conclusion

- We found the L1 Jet trigger rates from offline jets at Lumi section 49 as;
  - ~65 Hz for Bit 15 (800 Hz from Run Summary)
  - ~20 Hz for Bit 17 (7 kHz from Run Summary)
  - ~195 Hz for Bit 18 (70 kHz from Run Summary)

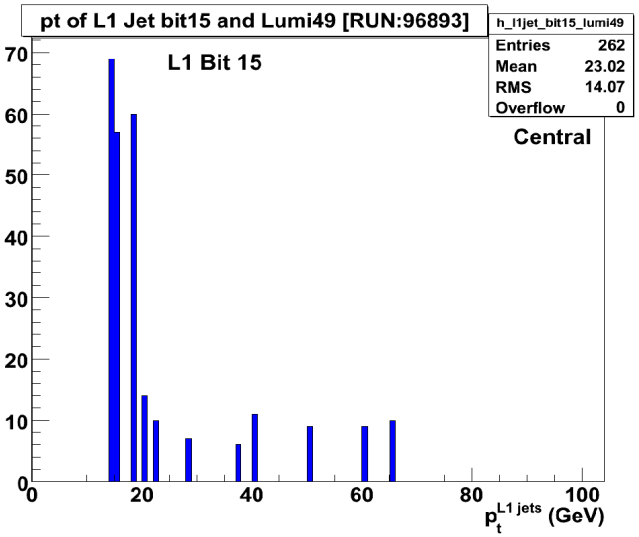
- The spike on jet trigger rates
  - The spikes was observed for L1 bit 17 & 18. The increment in rates for L1 bit 18 was almost 10 times greater than L1 bit 17.
  - There was no spike for L1 bit 15.
  - It is because of Prescale factor.

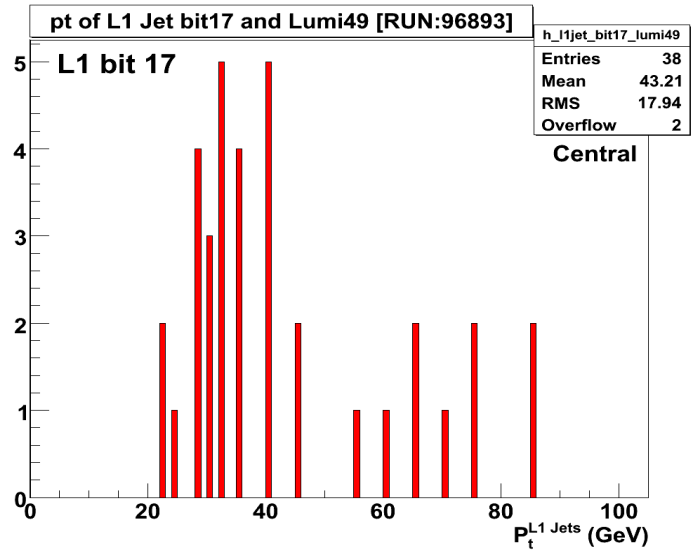
- The spike on jet trigger rates comes from anomalous picks in orbit number at LS 49.

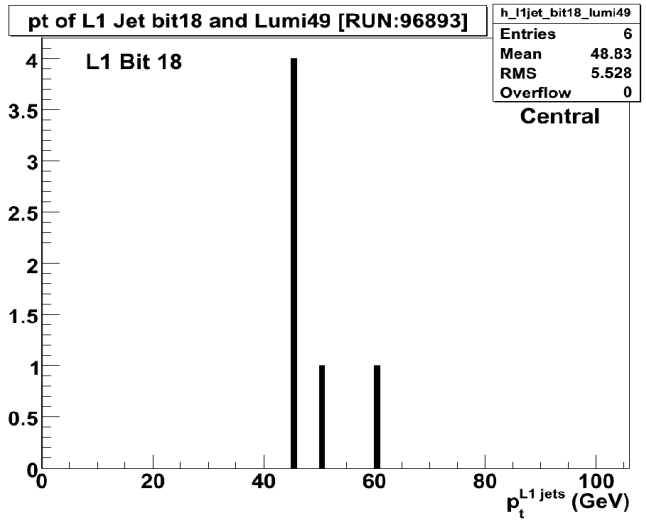
- We are planing to search for the other same events.

Backup Slides

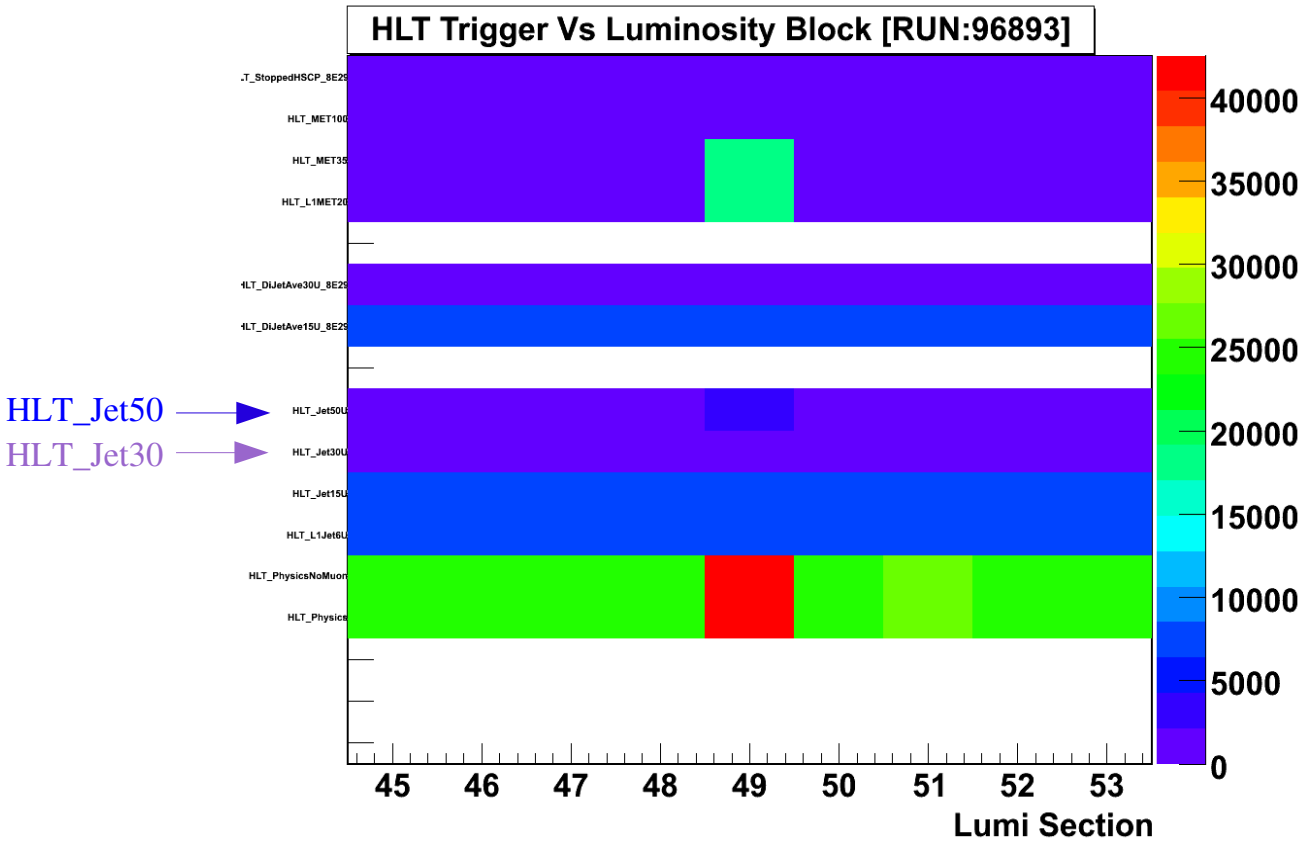
Pt Distribution of L1 Jets at LS 49



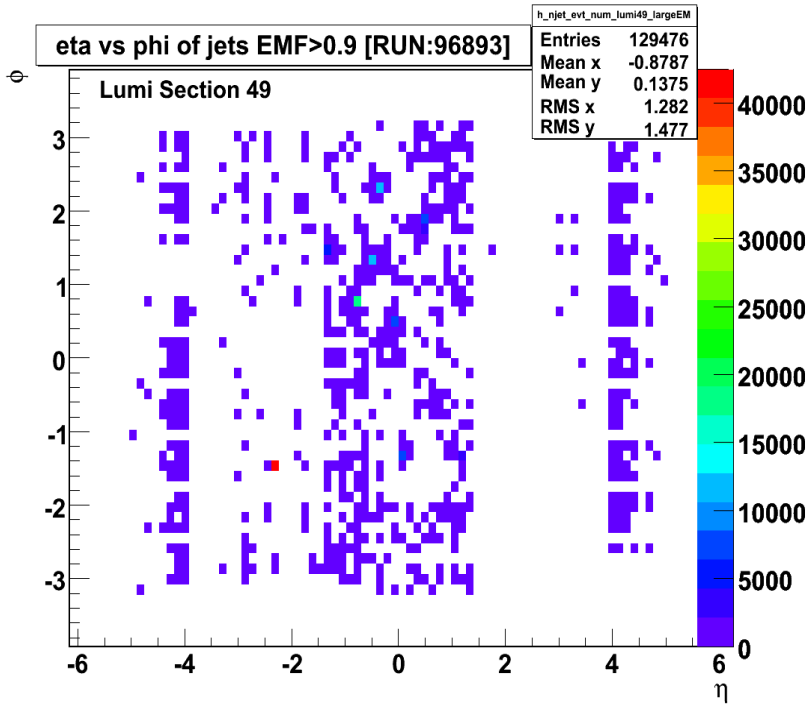


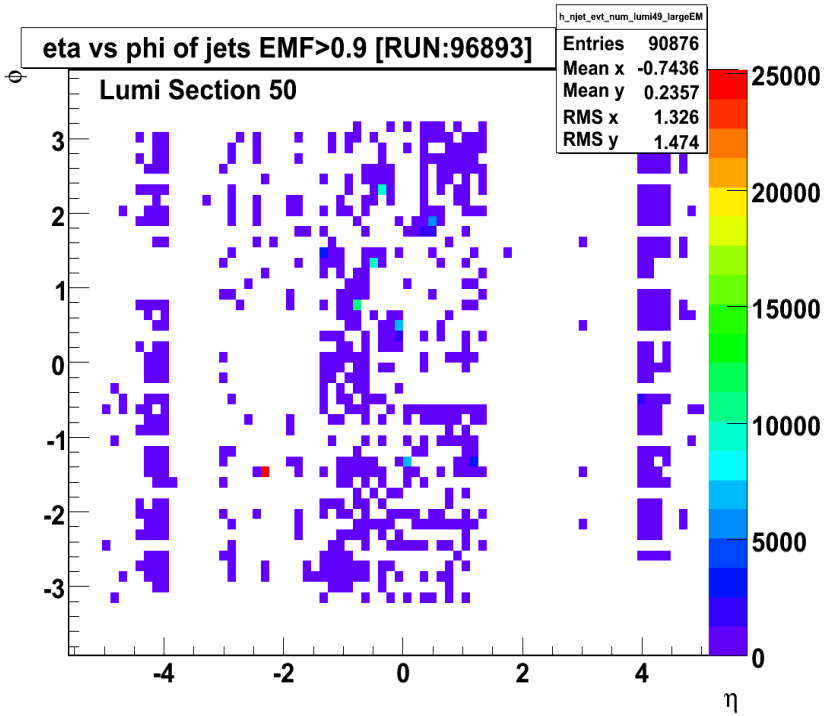


HLT Rates vs Lumi Section

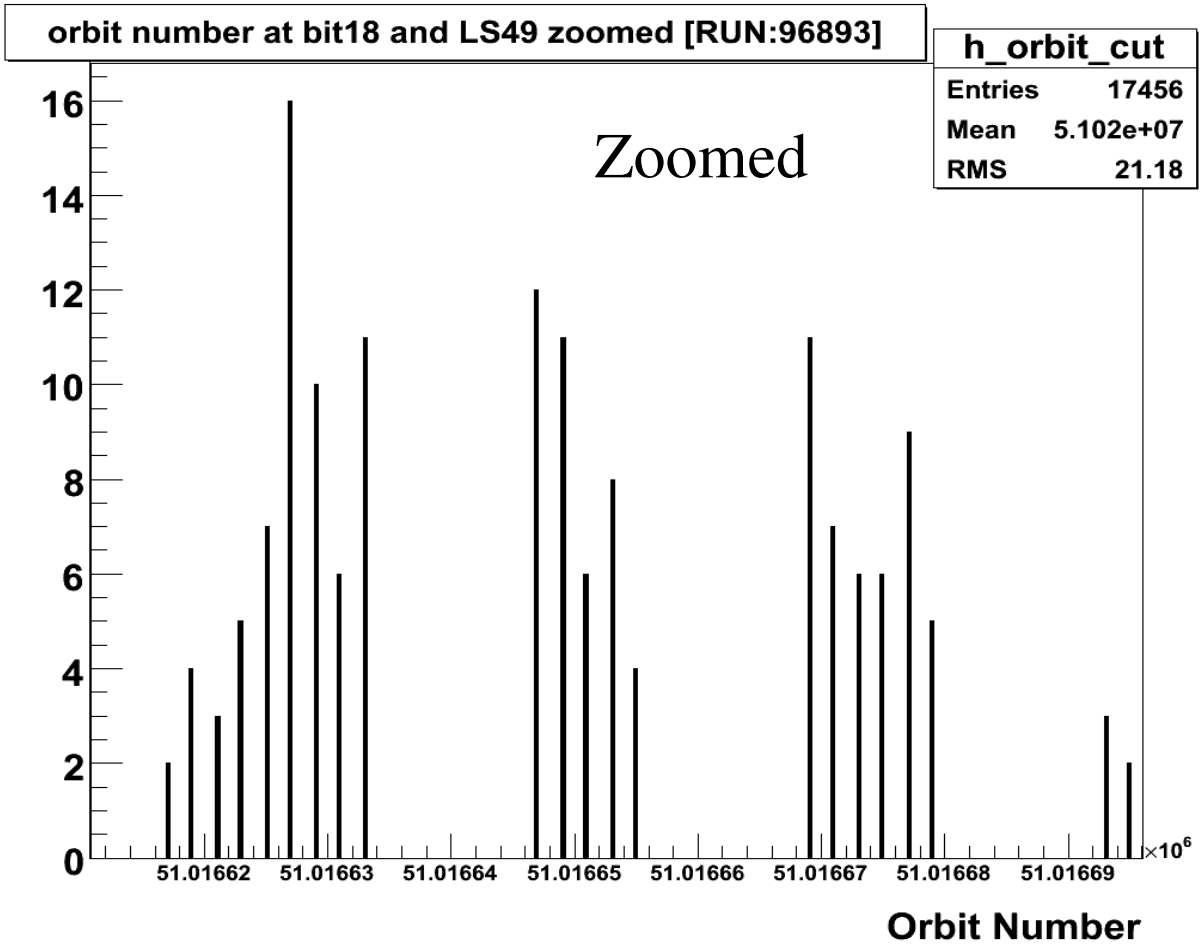


Ecal Hot Channels





Spikes in Orbit Number at LS 49



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Trigger Rates Table

You are here: TWiki > CMS Web > HCALWikiHome > HcalRocFnal > HcalRocTrigRates

r2 - 03 Jun 2009 - 00:44:59 - SertacOzturk

Hcal Roc Trigger Rates

global runs, r96xxx-96yyy

run number	L1 Physics Rate (Hz)	L1_SingleJet6U Trigger Rate (Hz) (bit=15)	L1_SingleJet20U Trigger Rate (Hz) (bit=17)	L1_SingleJet30U Trigger Rate (Hz) (bit=18)	L1_SingleEG1 Trigger Rate (Hz) (bit=45)	L1_SingleMuOpen Trigger Rate (Hz) (bit=55)	Comments
MWGR 21							
97029	331.25	66.46 (without spikes, ~61)	64.07 (without spikes, ~24)	573.11 (without spikes, ~210)	951.29 (without spikes, ~380)	341.16	There were spikes at last two points
96994	262.80	59.58	18.02 (first group ~24, second group ~1.4)	161.97 (first group ~220, second group ~6)	296.58	337.82	Trigger rates were not stable. After a point, trigger rates significantly decreased
96893	548.13	80.43 (without spike ~74)	82.52 (without spike ~24)	804.44 (without spake ~210)	333.38	331.10	There was a spike at a point. It caused bigger rate results
96888	379.84	74.52	22.46	241.08	358.96	331.56	Trigger rates were not stable. There were many lower rates points