
# CRAFT Analysis
# - Level 1 Jet trigger rates and Jet Background -

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JTERM III

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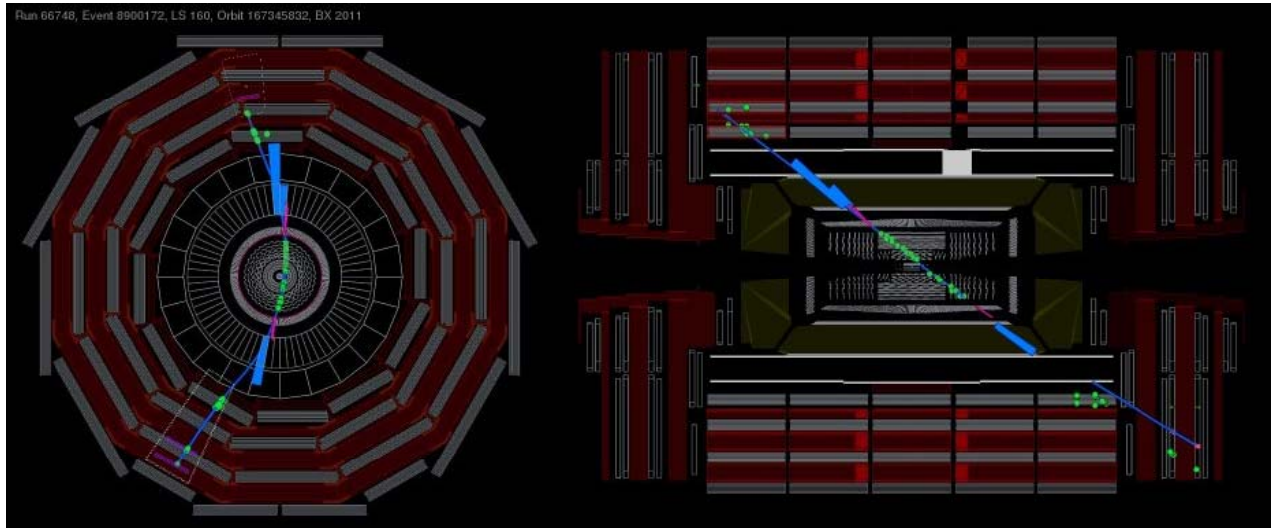
# CRAFT

- October 13th, 2008 - November 11th, 2008
- CMS has run for 4 continuous weeks 24/7
- Collected ~ 300M cosmic events with 3.8T
- Cosmic muon trigger rate ~300 Hz
- Total data-taking efficiency ~60 %
- Proved that CMS was READY for the LHC



# Analysis of L1 trigger rates in CRAFT

- Reconstuct L1 trigger rate offline from event/orbit numbers
  - L1 scaler information is not directly available from event data
- CMSSW_2_2_0
- L1PromptAnalysis class
  https://twiki.cern.ch/twiki/bin/view/CMS/onlineWBL1FastAnalyzer
- Extract time information from Orbit number
  - Orbit number: 32bits, reset at start of a new Run
  - LHC Revolution Frequency: 11245 Hz (1 orbit = 1/11245 sec.)
  - Trigger rate = (# of trigger count)/Δ(orbit number) x11245 (Hz)

- Post dead-time rates per trigger bit

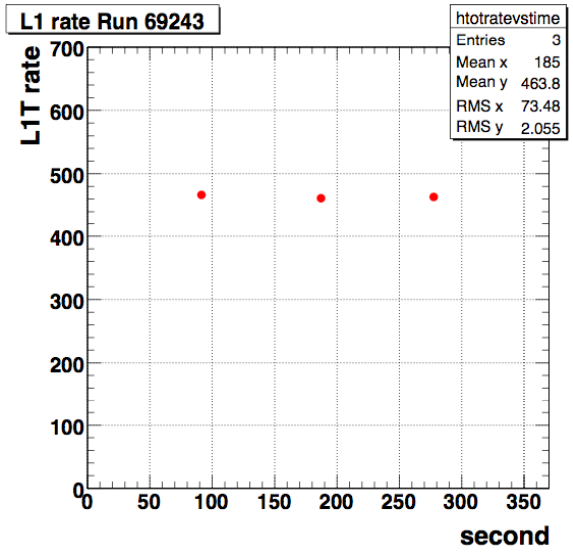
# L1 triggers used in CRAFT

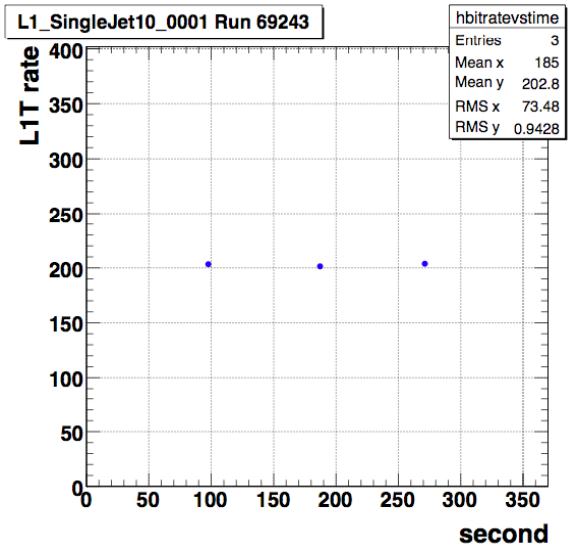
- L1Menu_startup2_v2
  - L1_SingleMuOpen : bit 55 (all runs)
  - L1_SingleMuBeamHalo : bit 54 (90% of runs)
  - L1_SingleEG1 : bit 46 (35% of runs)
  - L1_SingleEG5 : bit 47 (20% of runs)
  - L1_SingleJet10_0001 : bit 16 (20% of runs)

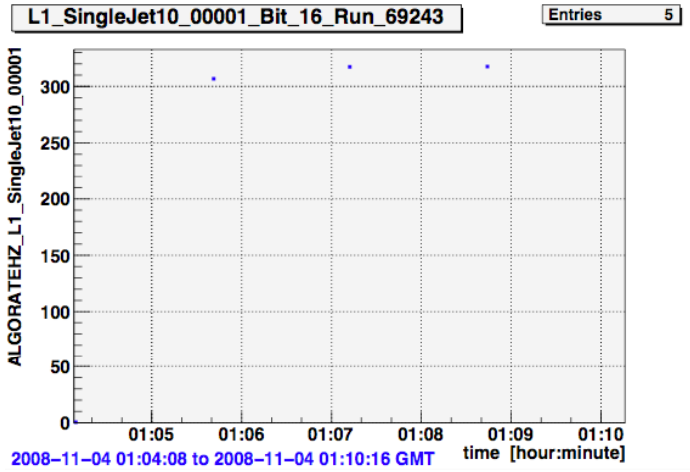
- Additional Triggers
  - HO technical trigger : Technical Trigger bit 11 (40% of runs)
  - Calibration trigger (70% of runs)
  - Random trigger : normally prescaled to 6 Hz (80% or runs)

# L1_SingleJet10_0001

## Run 69243



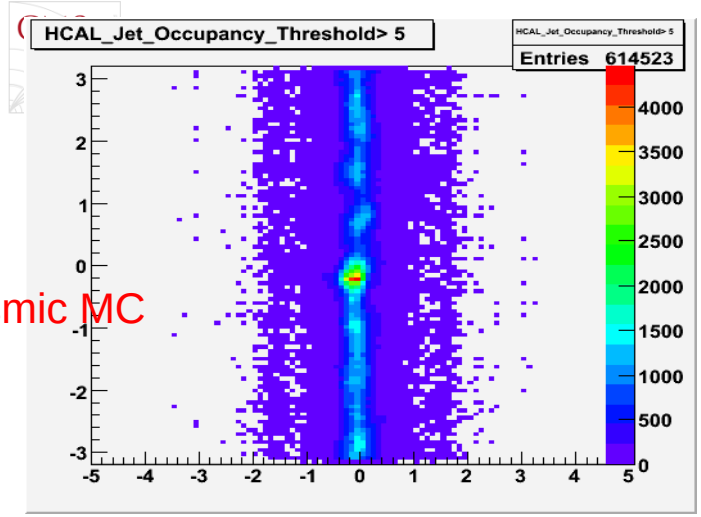




- Post dead-time rates per triger bit are not yet available online
  - Will be available in future
- L1_SingleJet10_0001: Post dead-time rate ~200 Hz
- Compare well with Pre dead-time rates
  - Online-calculated Pre dead-time available in WBM RunSummary

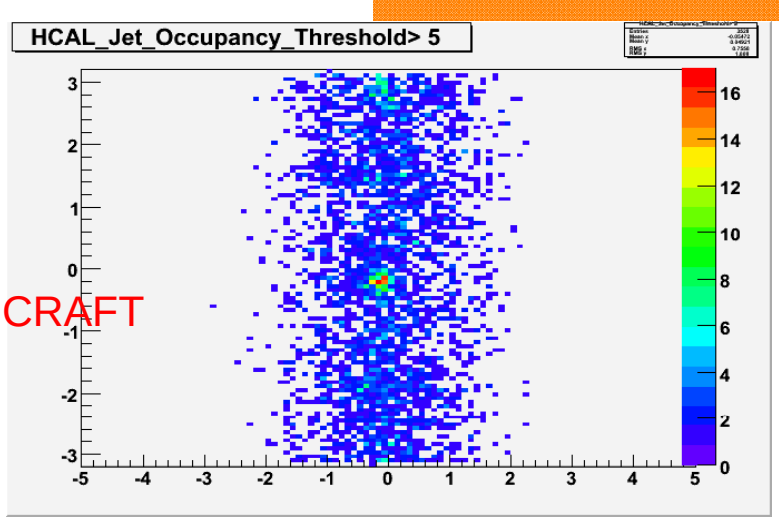
# Cosmics in CRAFT and MC data

Kerem Cankocak

Cosmic MC



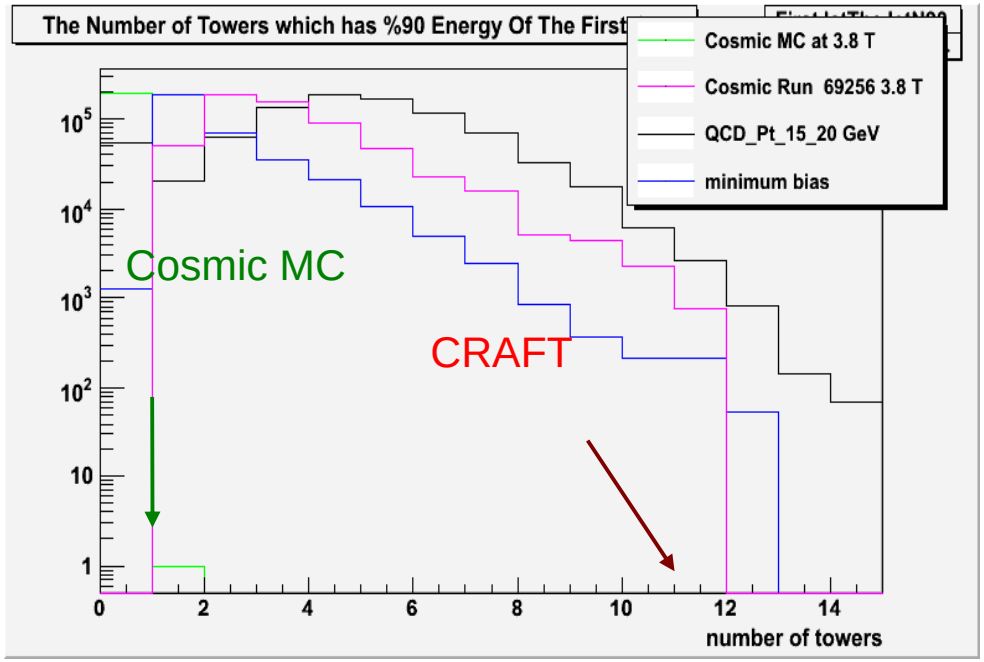

CRAFT




In Cosmic MC first JET has 90% of the energy in one tower.

CRAFT the First JET's energy is in many towers (like in minimum bias and QCD events)

correct Pedestal calculation is crucial!



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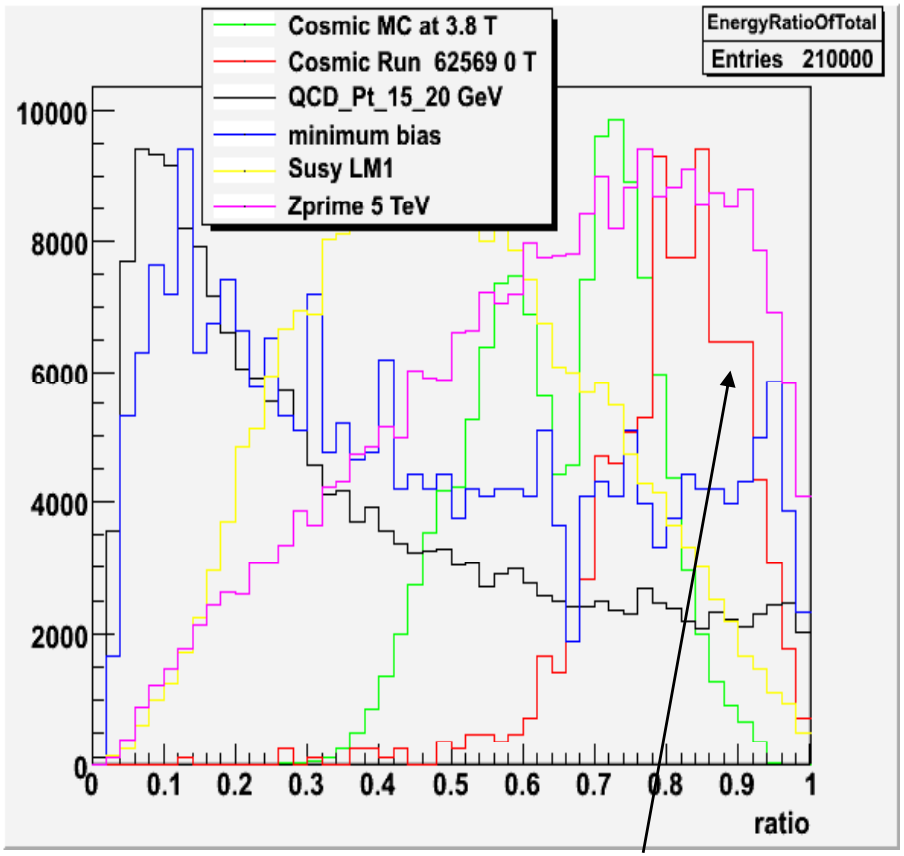


**Cosmic run 62569**

- First Jet Energy / Total Energy
- A possible variable to discriminate QCD or Minbias

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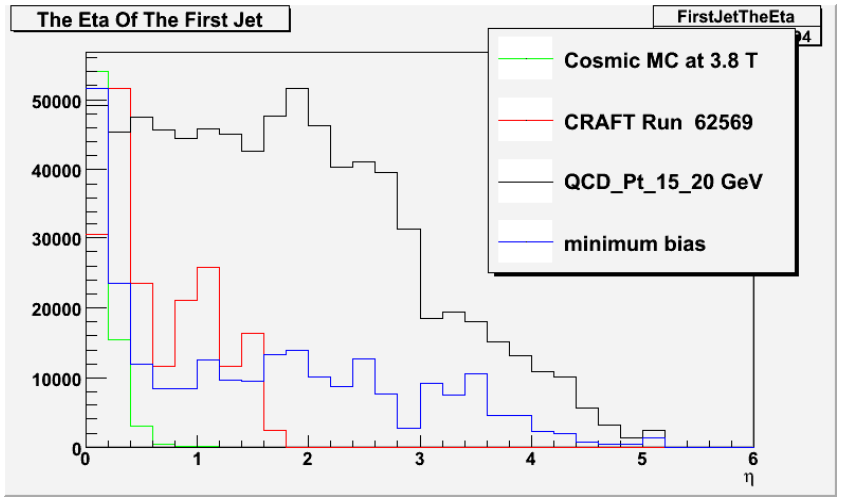


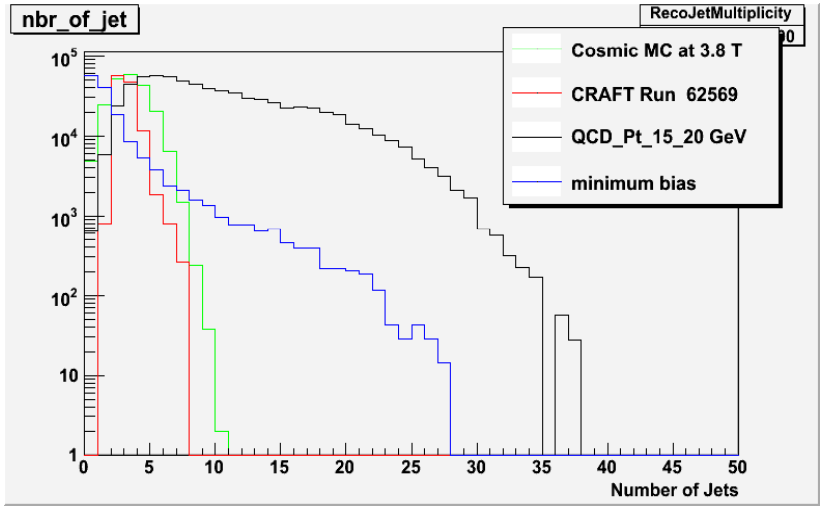


- There are more variables available for checking
- HCAL noise need to be understood better
  - Correct pedestal calculation is playing a crucial role!
- On-going work for tuning/checking