
Data Quality Studies

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Introduction

Large amount of data on tape & coming which we want to analyse!!

=====> Check the quality of our devices e.g HCAL

Define a Run Status: Good, Medium, Bad
- all Information had to be stored in a DB

Data Quality Tools

- RootTreeWriter:

- Modular **Root-Ntuple** where **Engines** can be switch on/off.
- Starting point: LCIO files

Engines: Trigger, Ecal ,Hcal, Tcmt & Drift Chamber

Root-Ntuples: only each 10th event is stored
----> 35M size for 25Kevts

Data Quality Ntuple Production

- Production:

Input:

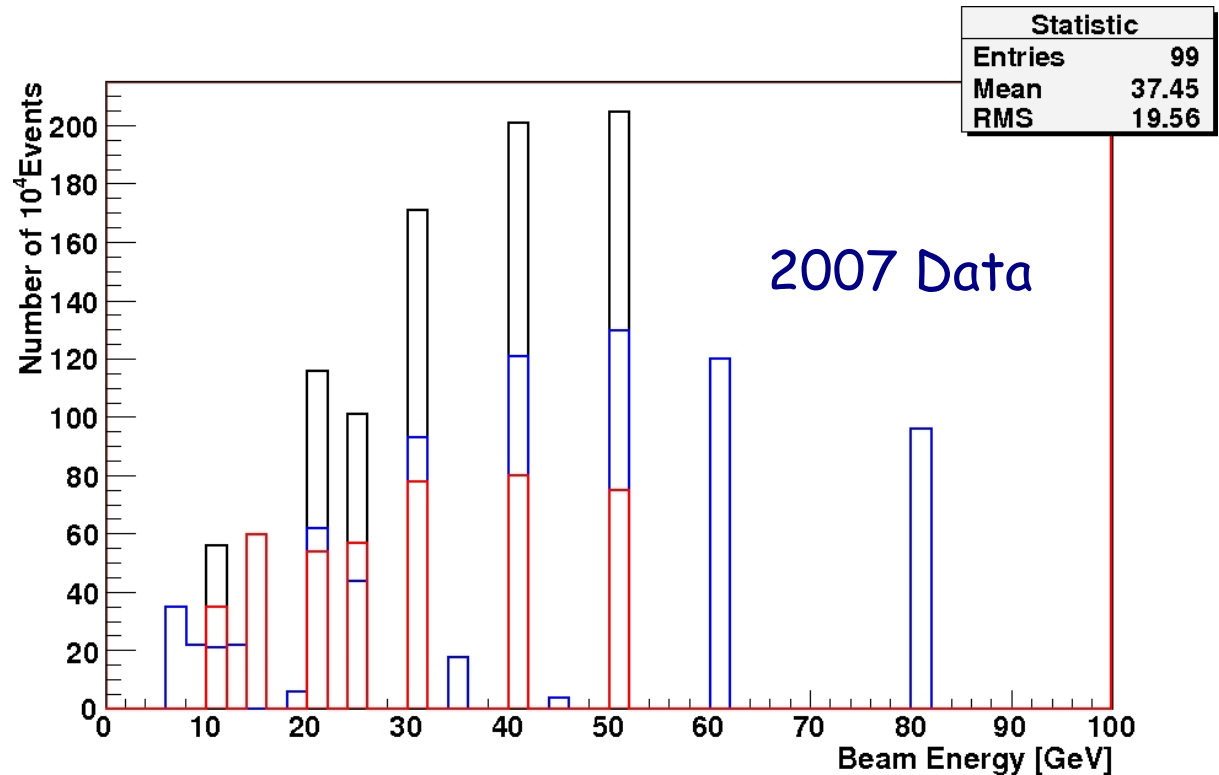
RunNumber

Output:

Root Ntuple,

Log-file,

DQ Summary List



~100 Runs processed: having different test beam configurations

Data Quality Information

From: Elog

From: DQ Root-Ntuple

Run Number

of total Events

Number of Events

of Beam-events

x, y, Θ

of Pedestal, muon-like & Physic events

of π , contained π & e

Pedestal mean (mip)

Mip-like mean (mip)

reconstructed Energy (GeV)

DC $x, y, x\text{-rms}, y\text{-rms}$

$x\text{-cog}, y\text{-cog}$ of Ecal

Event Classification

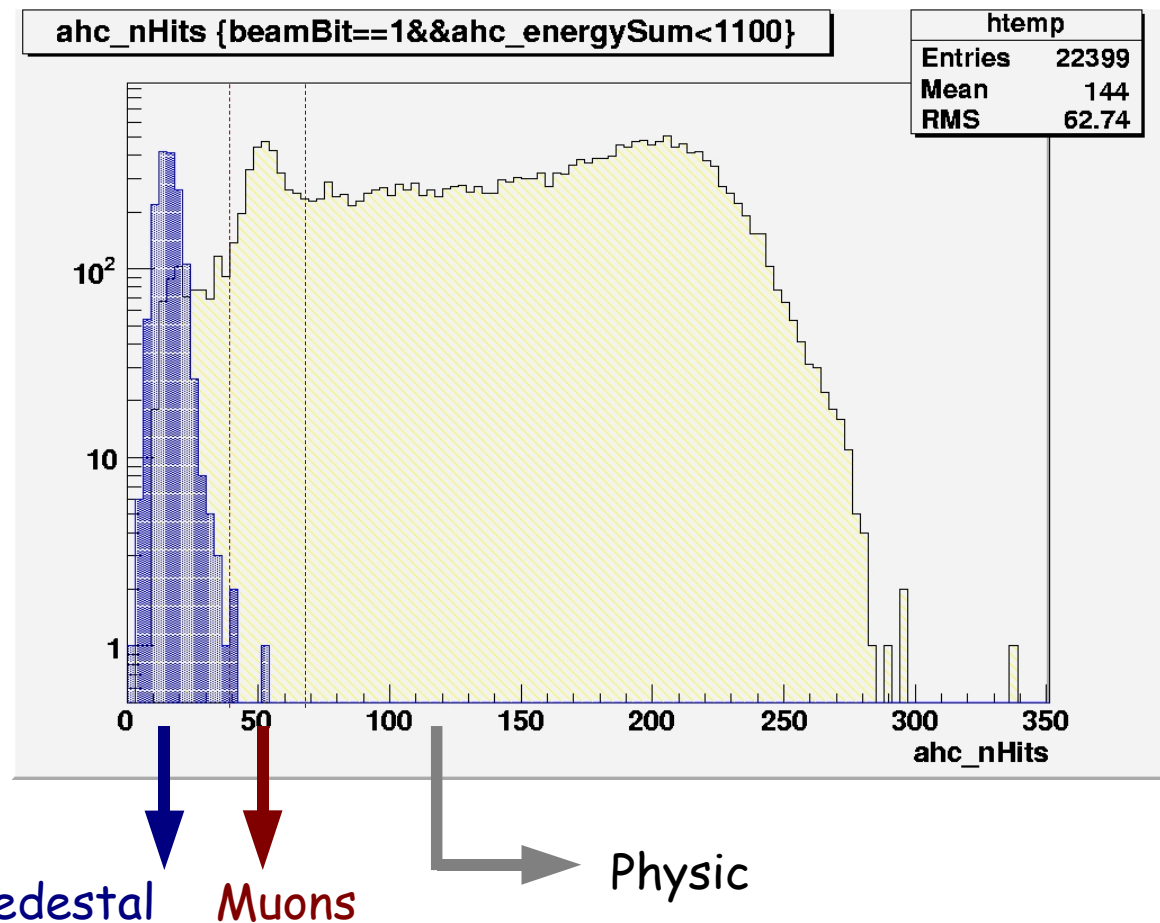
Number of events in a Run:

- Pedestal tagged by random trigger
- Muons tagged by beam trigger
- Physics events tagged by beam trigger

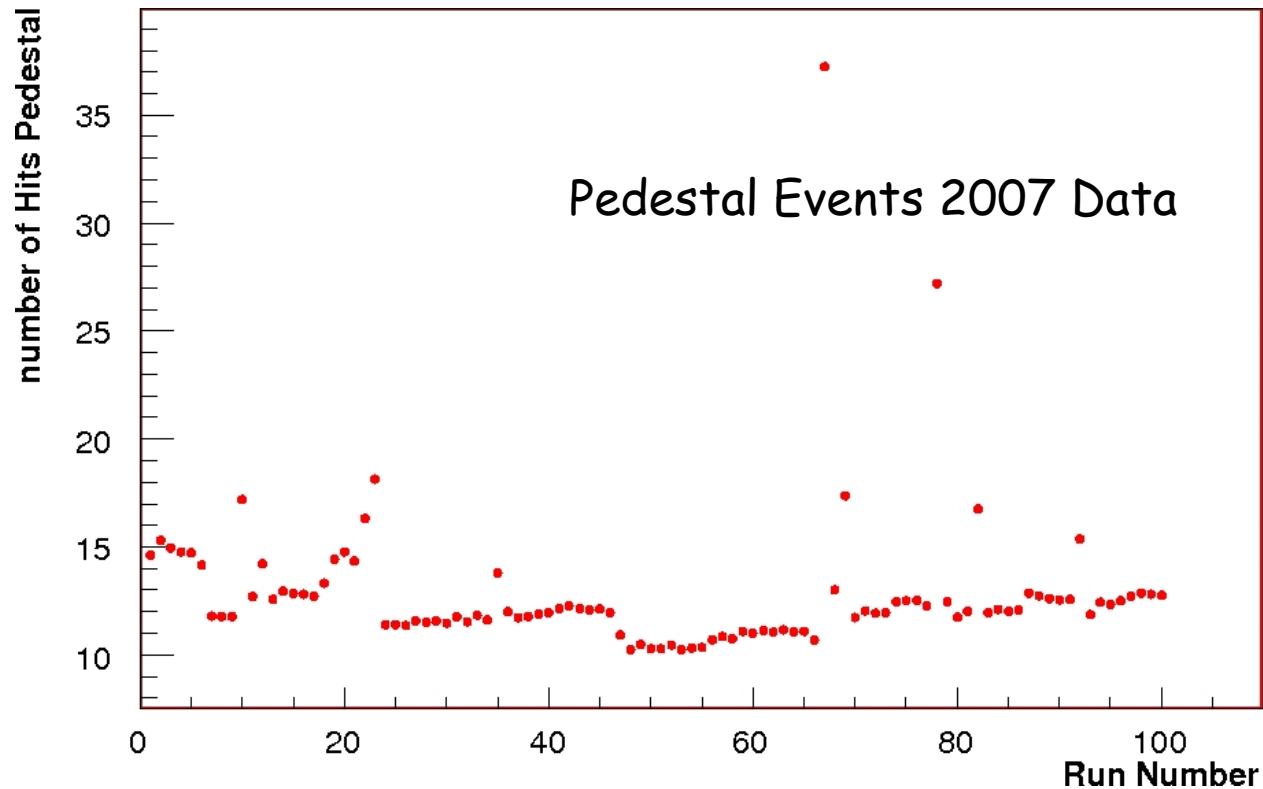
a) Stability of the detector

- # of hits of Pedestal
& muons events

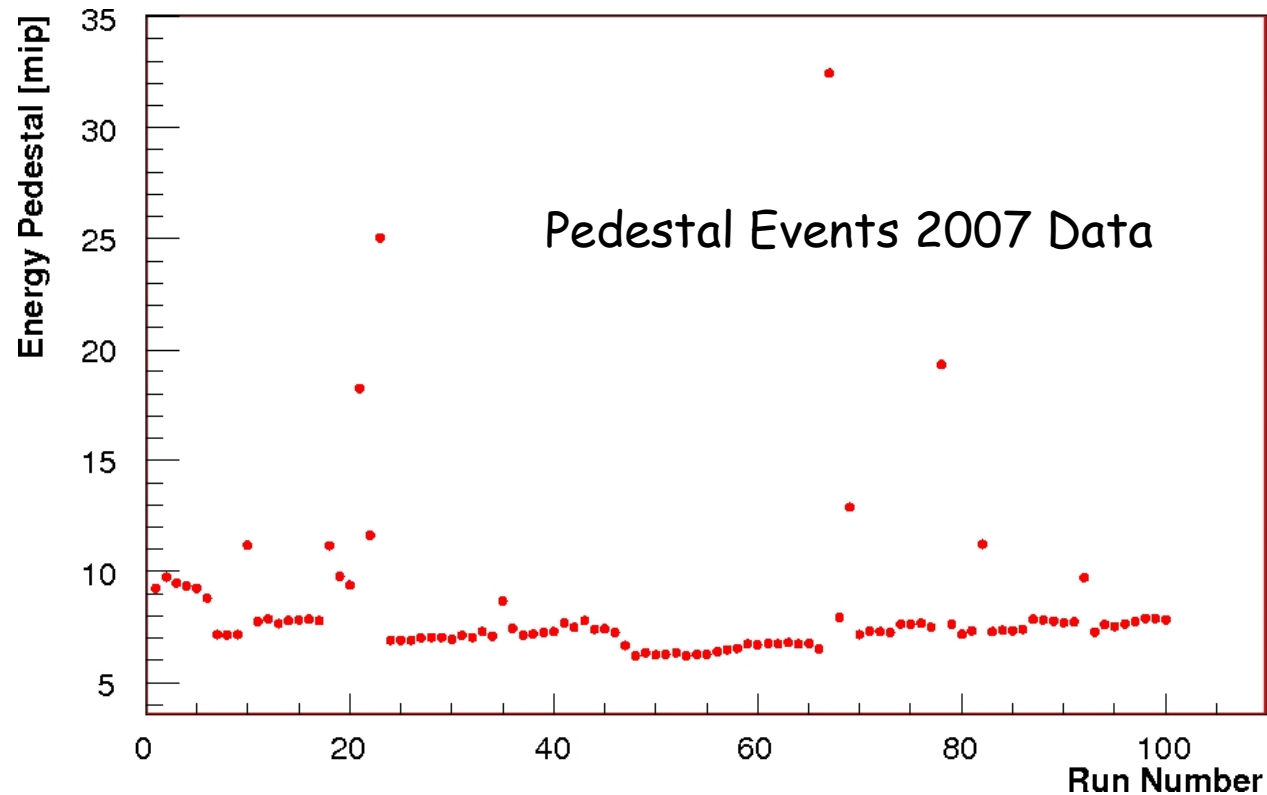
b) How many events
do we have for physic
analysis?



Number of Hits of Pedestal events

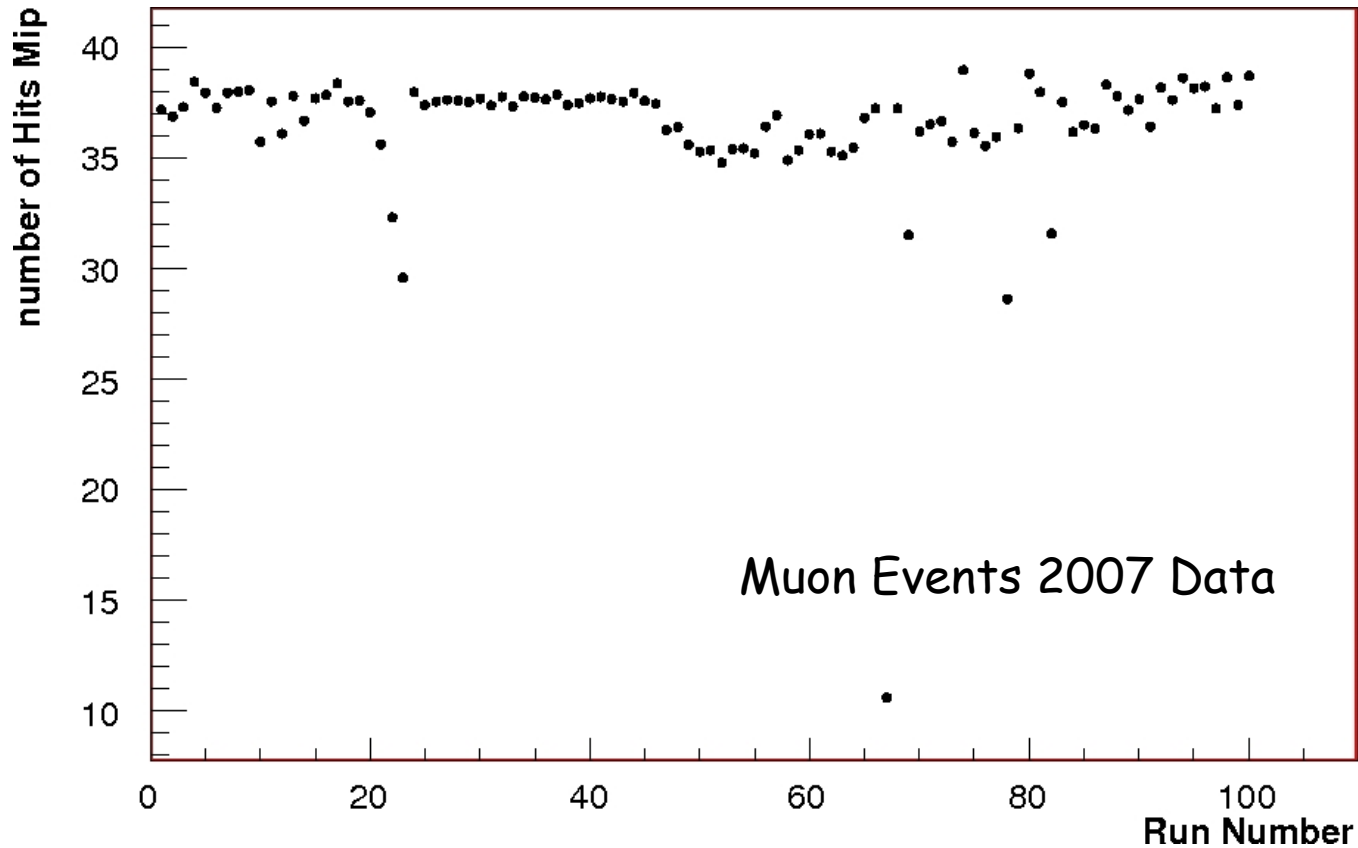


Mean Energy of Pedestal Events



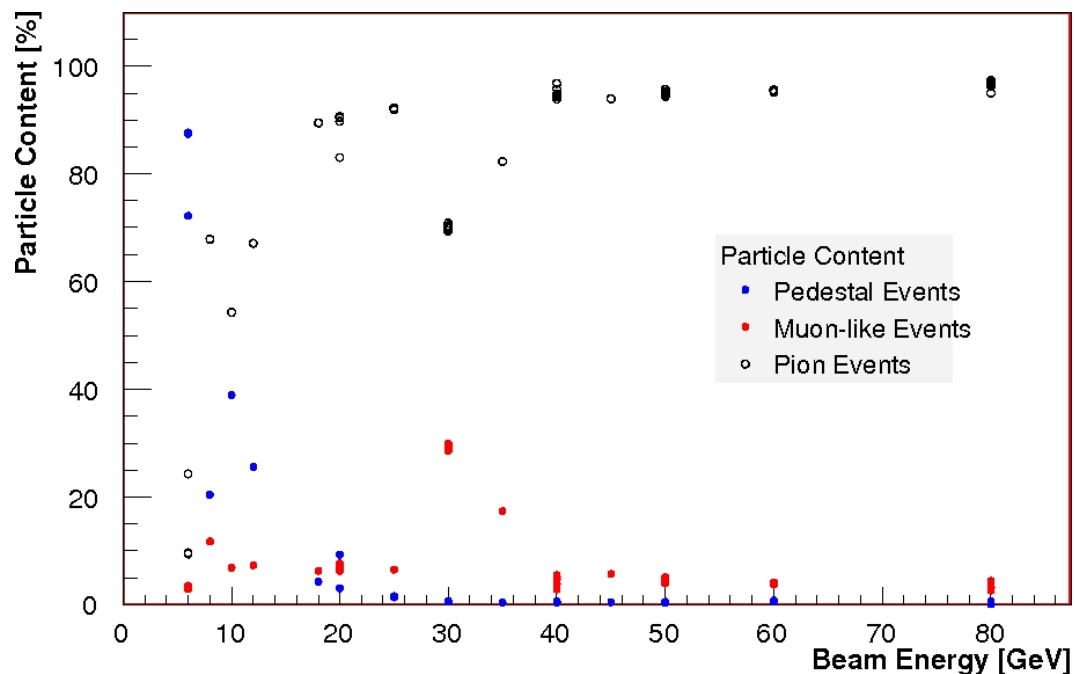
- sensitive to change in the calibration (temp. dependence of SiPM response)
- average amplitude of a noise hit = 0.7 mip, consistent

Number of Hits of Muon events



expected 38* detection efficiency (0.93-0.95) ~36 Hits

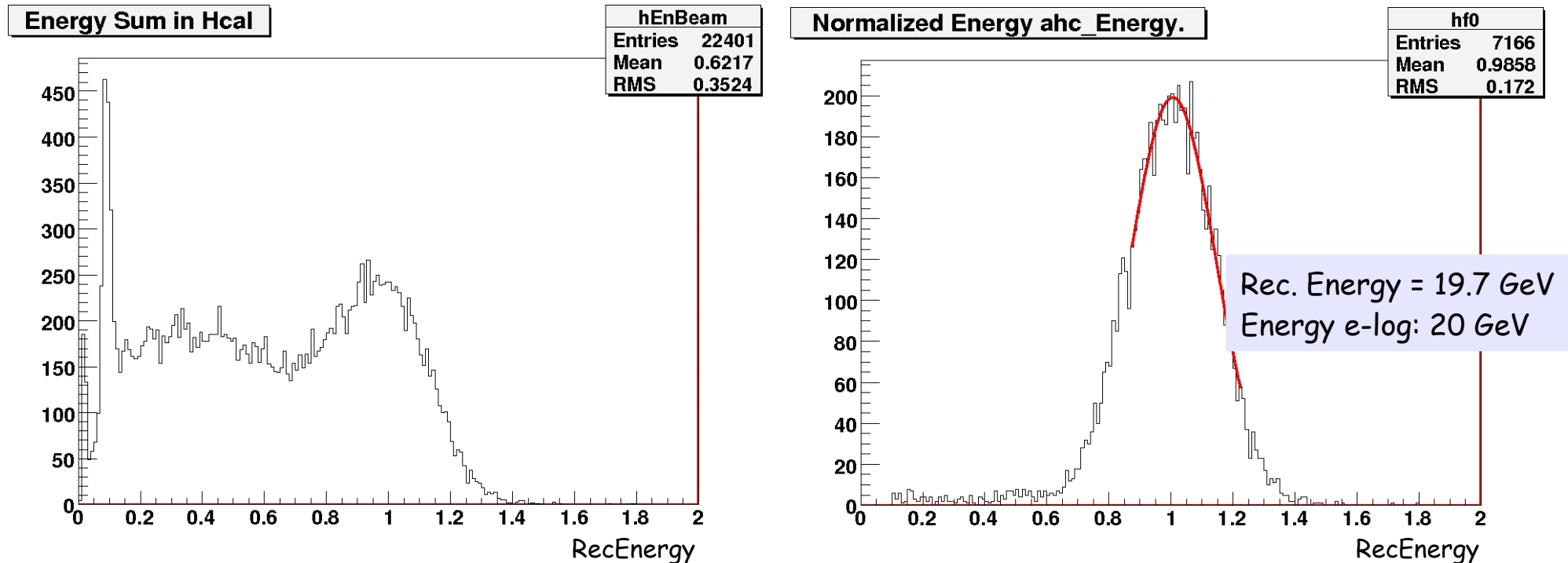
Event Classification



- ~50% of physics events in a 10 GeV run (down to ~20% at 6 GeV)
- About 10% muons present at every energy

Increased number of pedestal at low energy due to low beam trigger rate

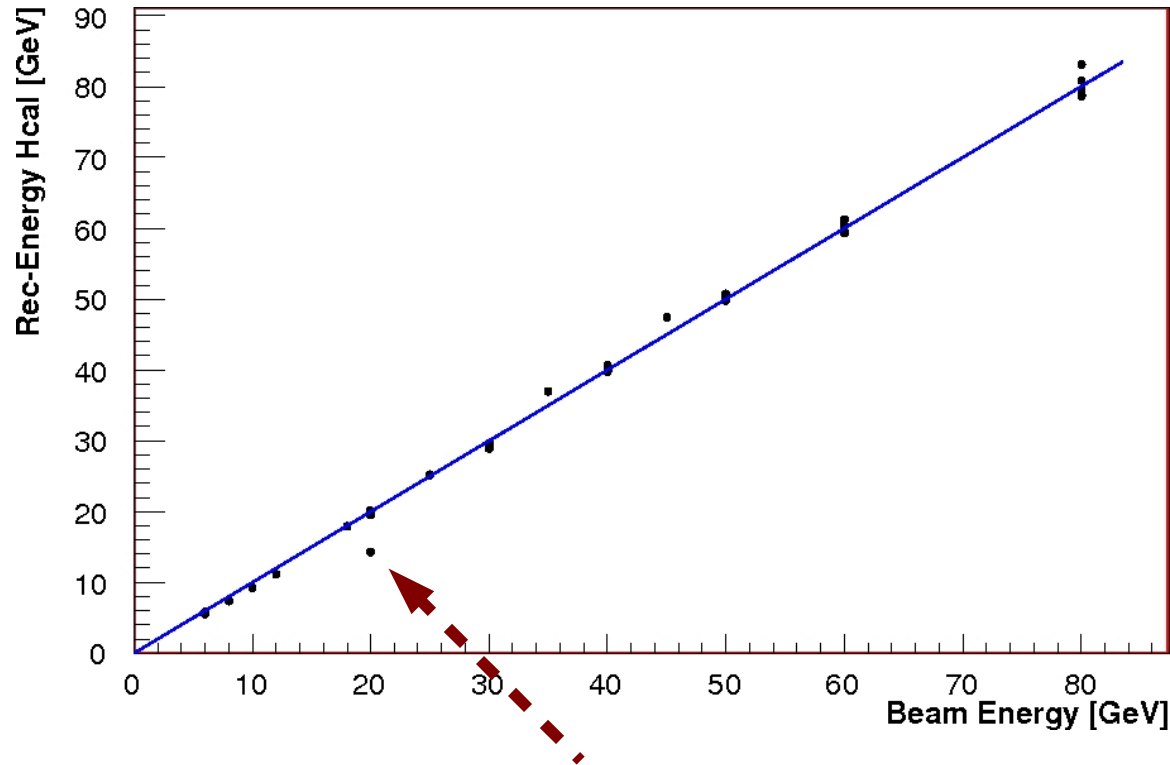
Reconstructed Energy: Pion Runs



Selection:

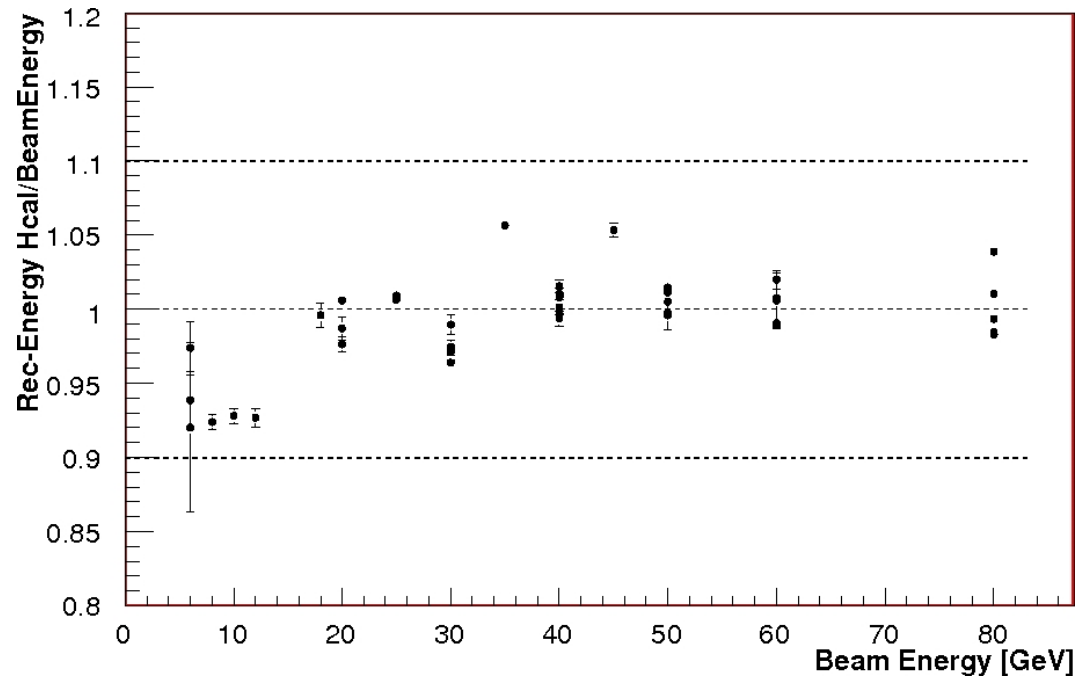
- low energy deposition on Ecal & Tail Catcher:
shower mainly begin in HCAL --> events with shower start in HCAL

Reconstructed vs Beam Energy



Aim: find runs where the reconstructed energy deviates significantly from the beam energy

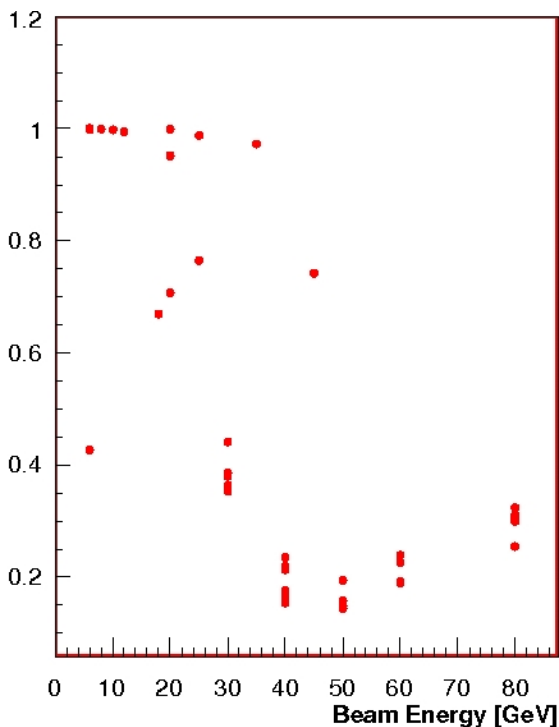
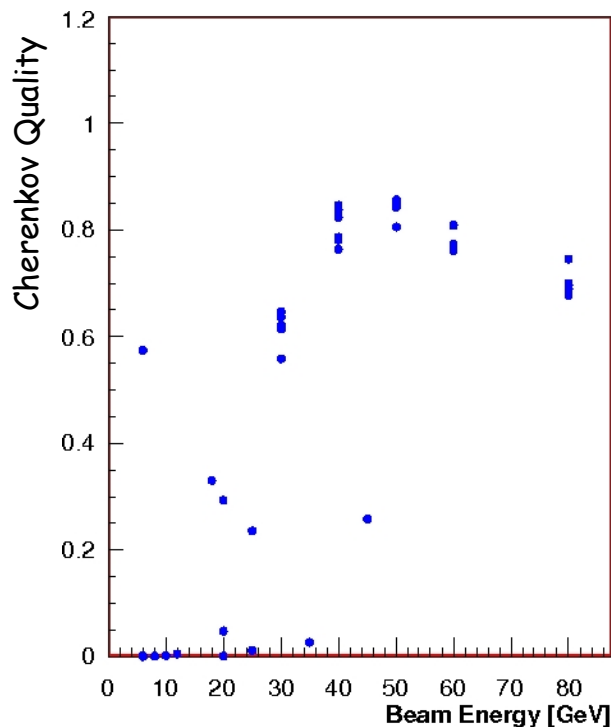
Reconstructed vs Beam Energy



Low energy runs (<20GeV) to be further investigated for systematic shift
compare same energy obtained with different beam optics settings

Quality of Cherenkov

Use contained pions in HCAL to check the quality of the Cherenkov:

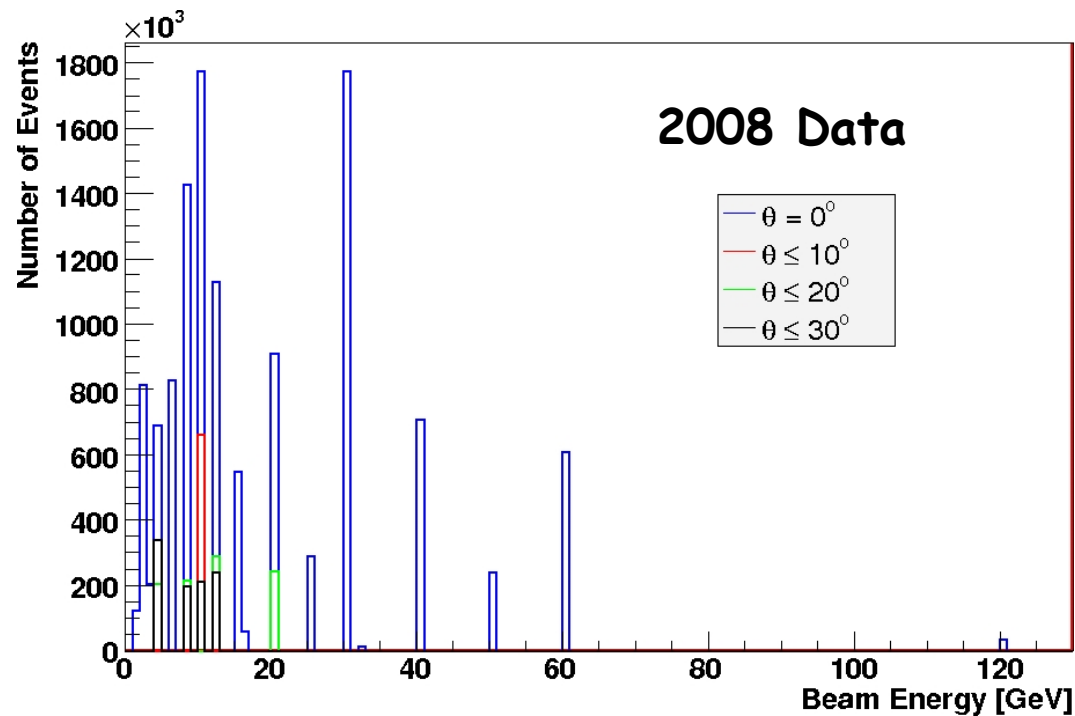


- $E > 30$ GeV Cherenkov cannot be used to tag pions
- $E < 30$ GeV expected 100% correlation with tagged pion sample in HCAL

identified some run with bad Ch-tag ==> to check bad pressure settings

Data Quality Analysis 2008

First Analysis performed with Online Monitoring Histograms



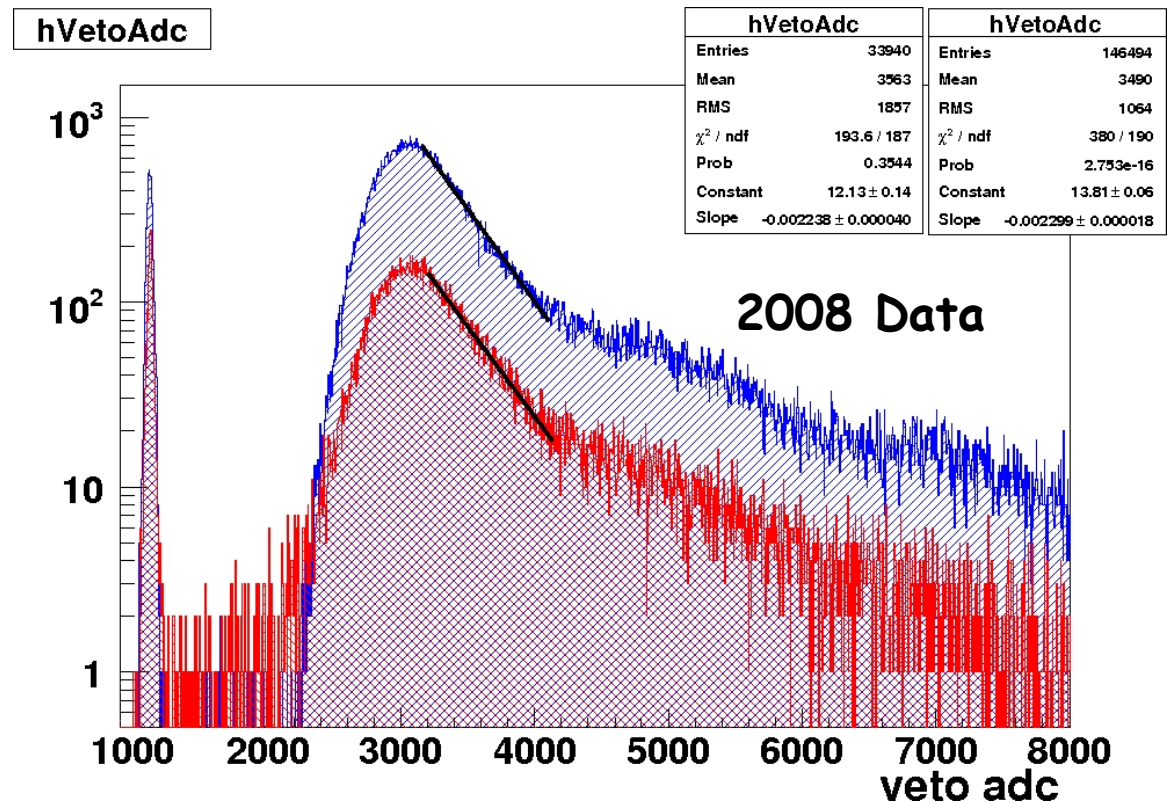
- Overall statistics at various energies and angles
- Lower statistic than at CERN
- Fraction of physics events in the sample to be studied by DQ

Event Classification

Number of Pedestal, Muon and Physic events defined as before

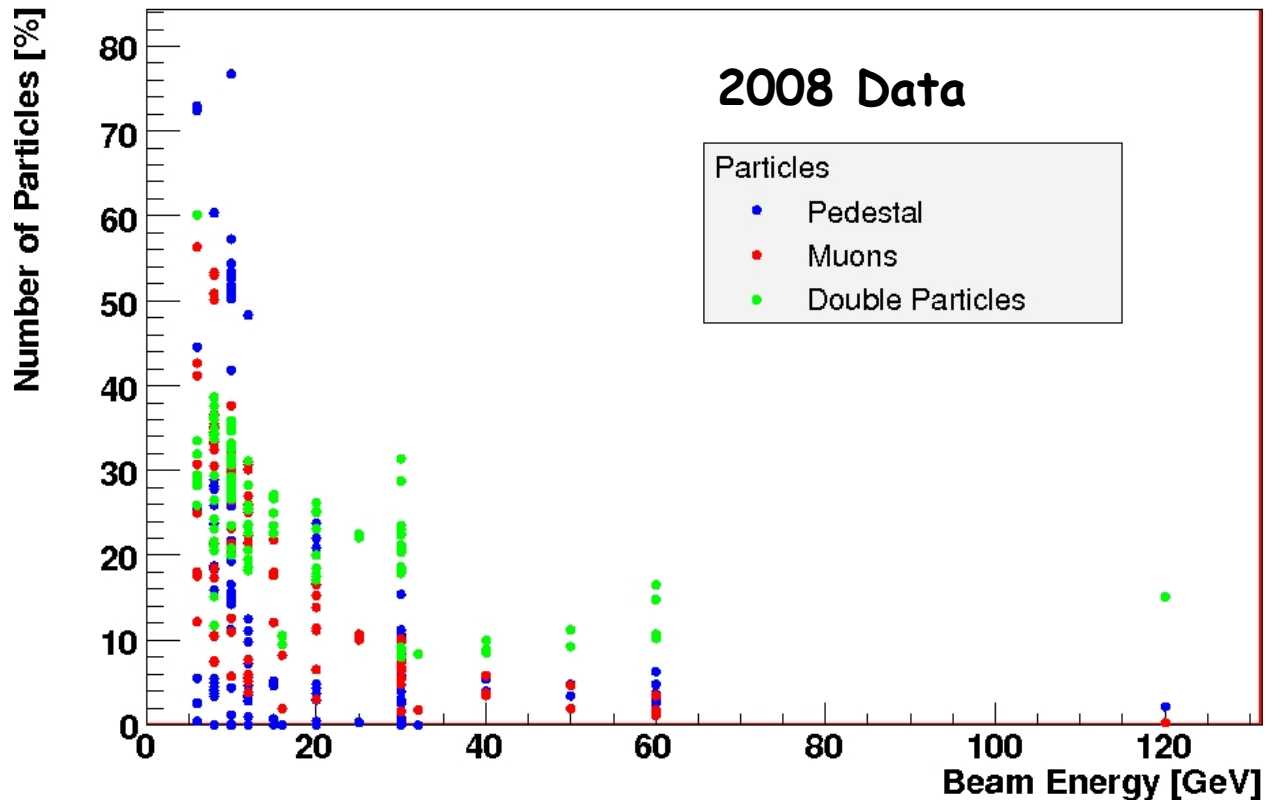
Estimation on double particles:

- 1) Use the multiplicity counter to cut on double tracks [20x20 cm² area]
- 2) Use digital information in veto counter to reject beam halo and preshowers in the 1x1 m² area outside the 20x20 cm² multiplicity.



Event Classification

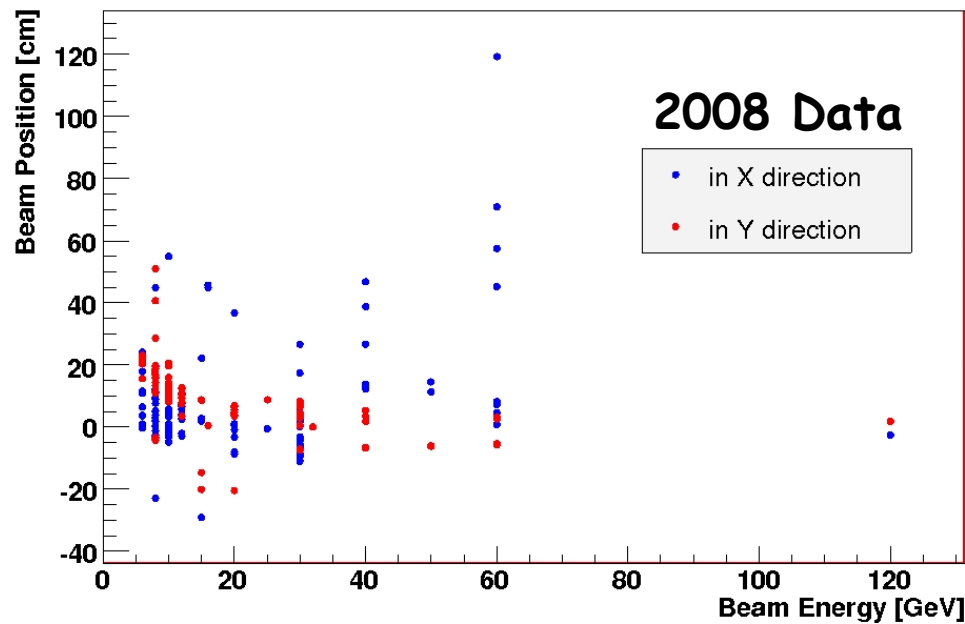
Background: Pedestal, Muons, Double Particles



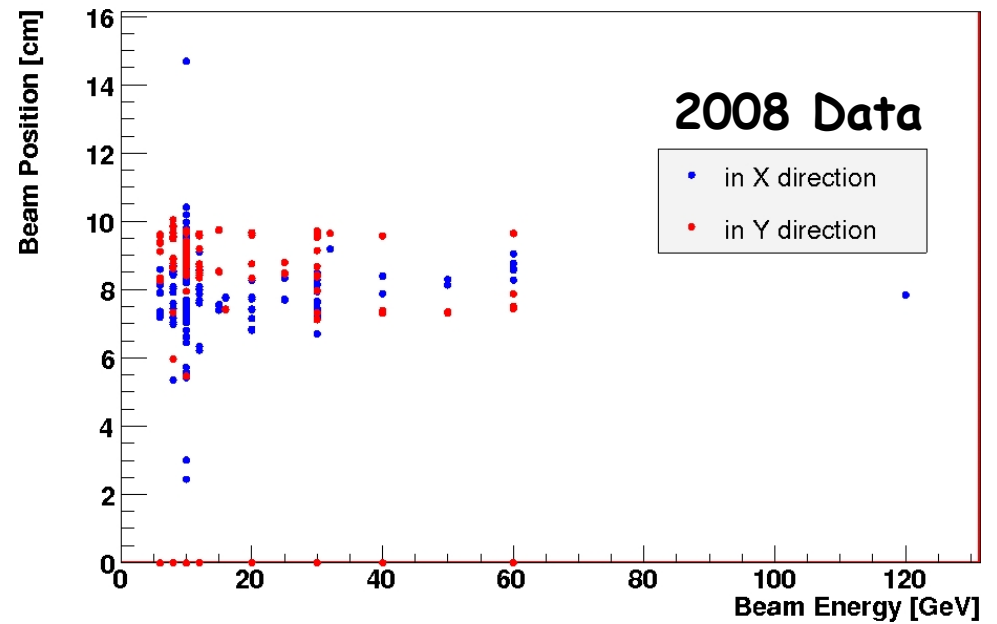
Low energy suffering of background events ==> low statistics in physics events

Beam Properties

Beam Position on the DC



Beam Position on the Ecal



Relative off set ==> alignment between Ecal & Drift Chamber

Summary & Outlook

Data Quality Analysis tool was developed

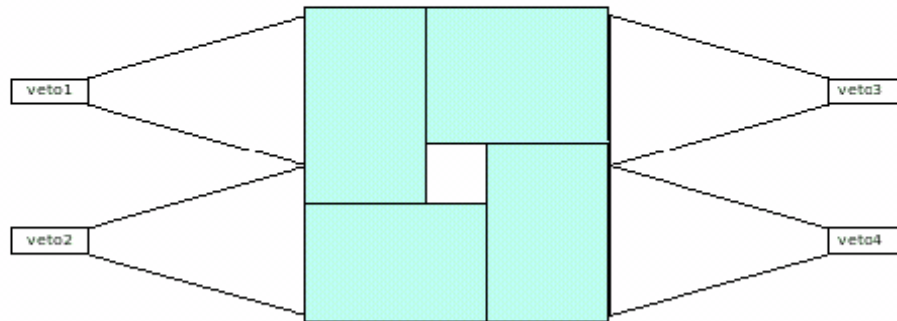
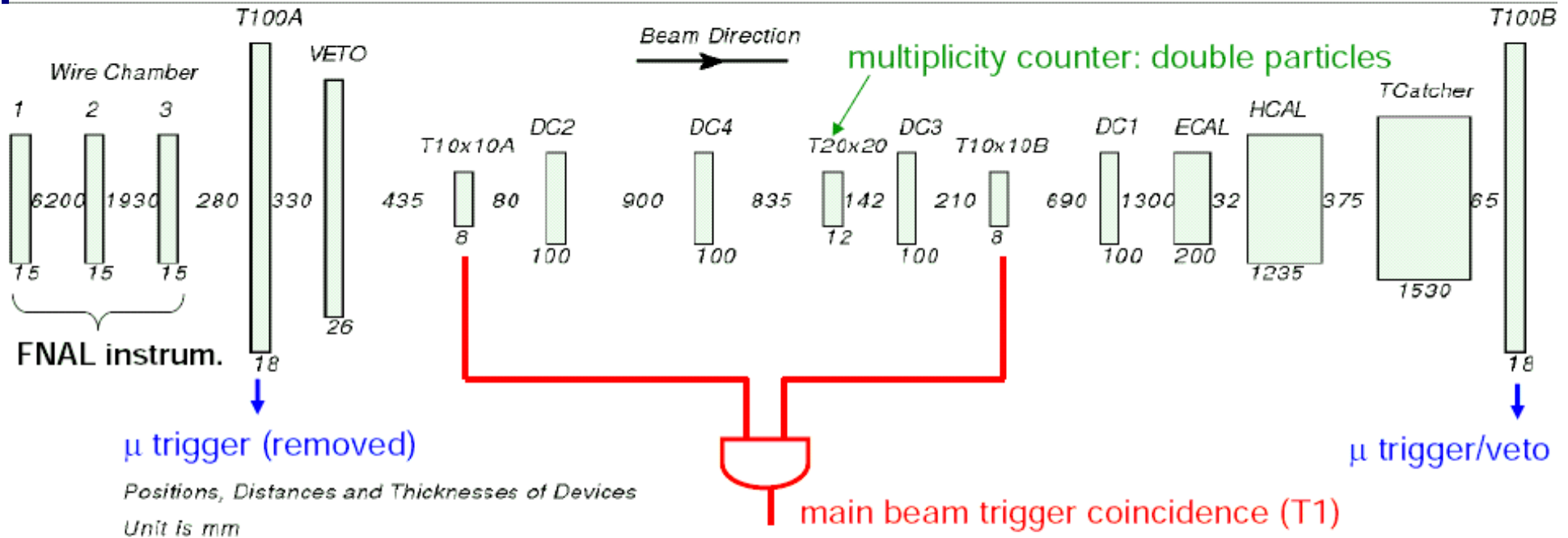
- 2007 Data

- stability of the detector was studied with the DQ tool
- more information has to be added to the Ntuple
 - > suggestions are appreciated!

- 2008 Data

- Monitoring histograms used to estimate number of events collected
 - > Next step is to use Root-Ntuples to analyze further the data

CALICE testbeam 2008 FNAL



veto counter:
100x100 cm, 20x20 cm hole on the beam line,
4 PMT readout → make a .or. in coincidence
with T1

beam points into image plane

Available Information

	2007	2008
Trigger	ok	ok
Ecal	ok	?
Hcal	ok	ok
Tcmt	ok	ok
Drift Chamber	ok	-
Number of Runs	~200	~80