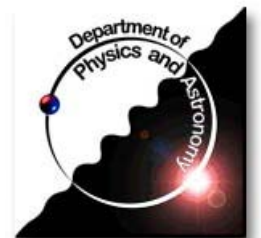
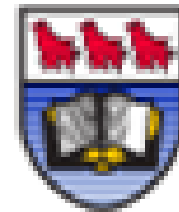


# LArNoiseMonToolBase update and work in progress

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# Improvements to LArNoiseMonToolBase since the Expert Week

- Remove number of channel dependence on rms
  - relevant only for feedthrough and region contexts
- Allow the monitoring of channel data distribution
  - new jobOptions
- Control the registration of expert histos (for internal use)
  - New jobOption
- Work in progress
  - Preparing a proposal for a helper class to manipulate HWIdentifier ↔ feedthrough/feb/channel names
  - Summary histogram for each of the 4 cryostat ends (easy to implement)

# Data monitored

## ■ LArDigitNoiseMonTool

- monitor one time sample, or the average over all time samples

## ■ LArRawChannelNoiseMonTool

- monitor the energy, or the time

$$d_{\alpha} = \left\{ \begin{array}{ll} \text{LArDigitNoiseMonTool:} & \begin{array}{l} \text{a given time sample} \\ \text{the average over all time samples} \end{array} \\ \text{LArRawChannelNoiseMonTool:} & \begin{array}{l} \text{energy} \\ \text{time (not clear if this will be useful)} \end{array} \end{array} \right.$$

FEB,gain context:  $\alpha = \text{channel \#}$

Feedthrough,gain context:  $\alpha = \text{slot \#}$  (1 FEB per feed slot)  
**(the data is averaged over all channels in a slot)**

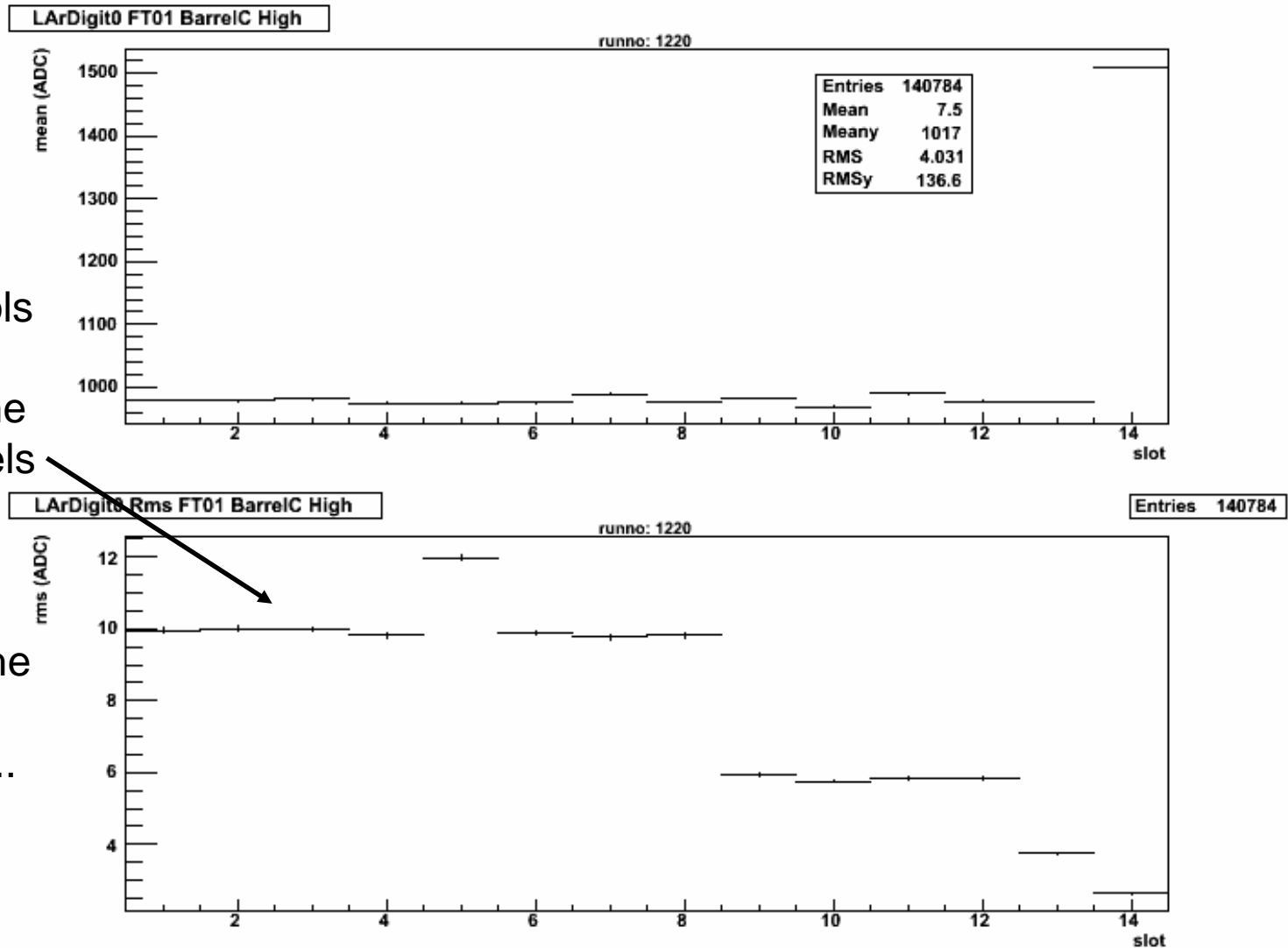
Region, gain context:  $\alpha = \text{ieta \#}$  **(the data is averaged over all iphi channels for ieta)**

# Data profile histograms

- Data profile histograms provide  $\mu[d_\alpha] \pm \sigma[d_\alpha]$  vs  $\alpha$
- For the FEB context (and LArDigitNoiseMonTool), they provide directly the pedestal and the pedestal rms
- For the Feedthrough and Region contexts, the rms depends on the number of channels (Nch) averaged per bin
  - This is not desirable. For example in the region context, this makes the ieta bin rms dependent on the number of crates read out (number of iphi channels for a given ieta).
- Since LArMonTools-00-01-45 the rms histograms for the feedthrough and region context show an effective channel rms.
  - This involves keeping track of the average of  $1/N_{ch}$  for each bin
  - New histogram directories: perFeedthroughNorm, perRegionNorm

$$\sigma_{\text{effective}} = \frac{\sigma[d_\alpha]}{\sqrt{\langle N_{\text{ch}\alpha}^{-1} \rangle}}$$

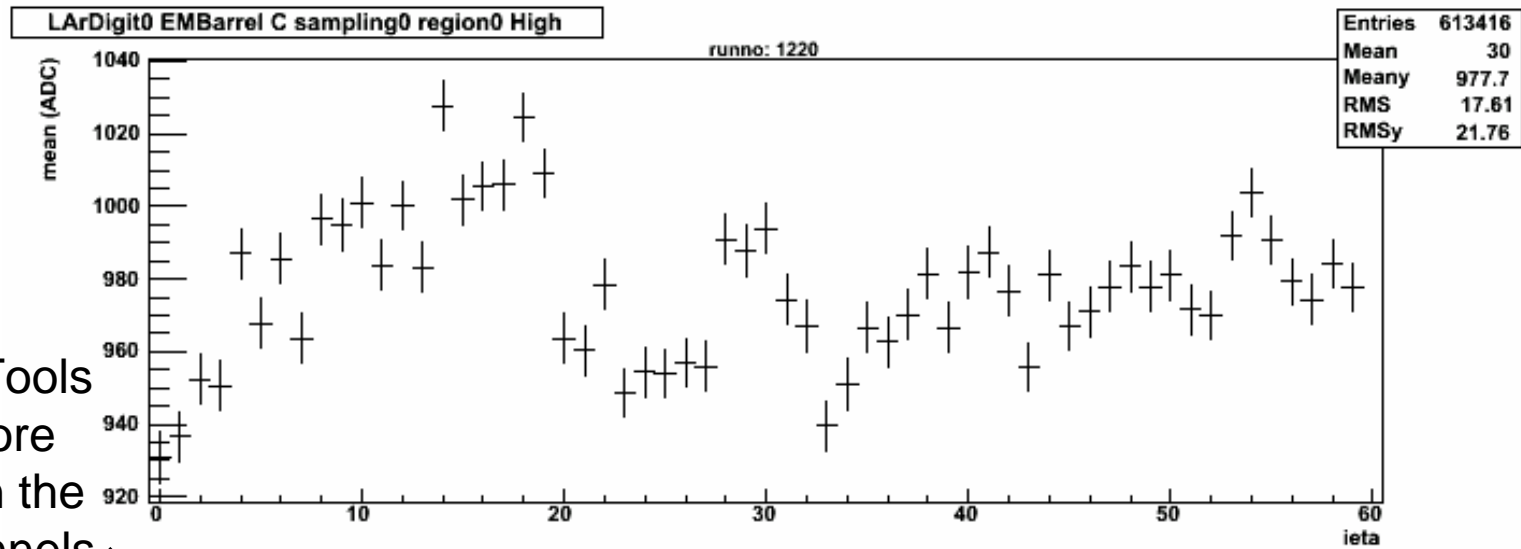
# Example: Rms histogram, feedthrough context



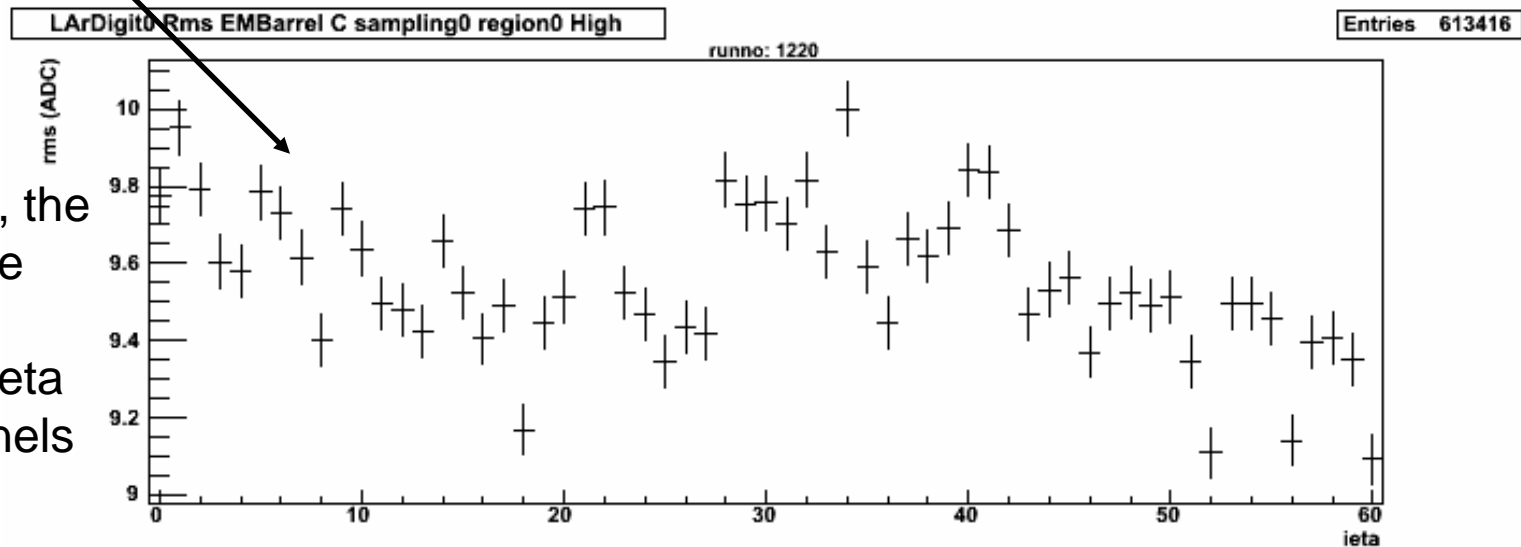
Since LArMonTools 00-01-45 no more dependence on the number of channels per bin.

In this example, the rms values were  $\sqrt{128}$  smaller...

# Example: Rms histogram, region context



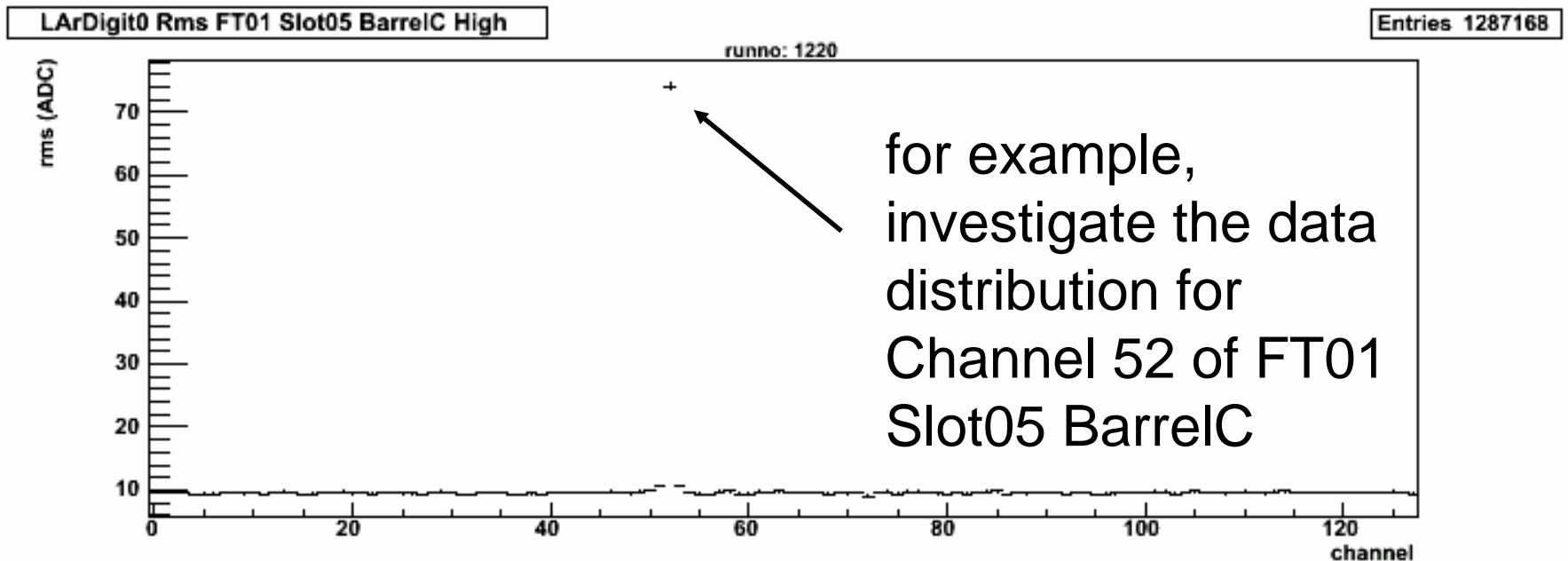
Since LArMonTools 00-01-45 no more dependence on the number of channels per bin.



In this example, the rms values were  $\sqrt{2}$  smaller because each ieta bin has 2 channels

# Channel data distribution

- Channel data distribution can now be monitored for selected FEBs
  - New jobOptions febIDsForChannelHistos and nBinsForChannelHistos
  - New histogram directory: perFebChannels

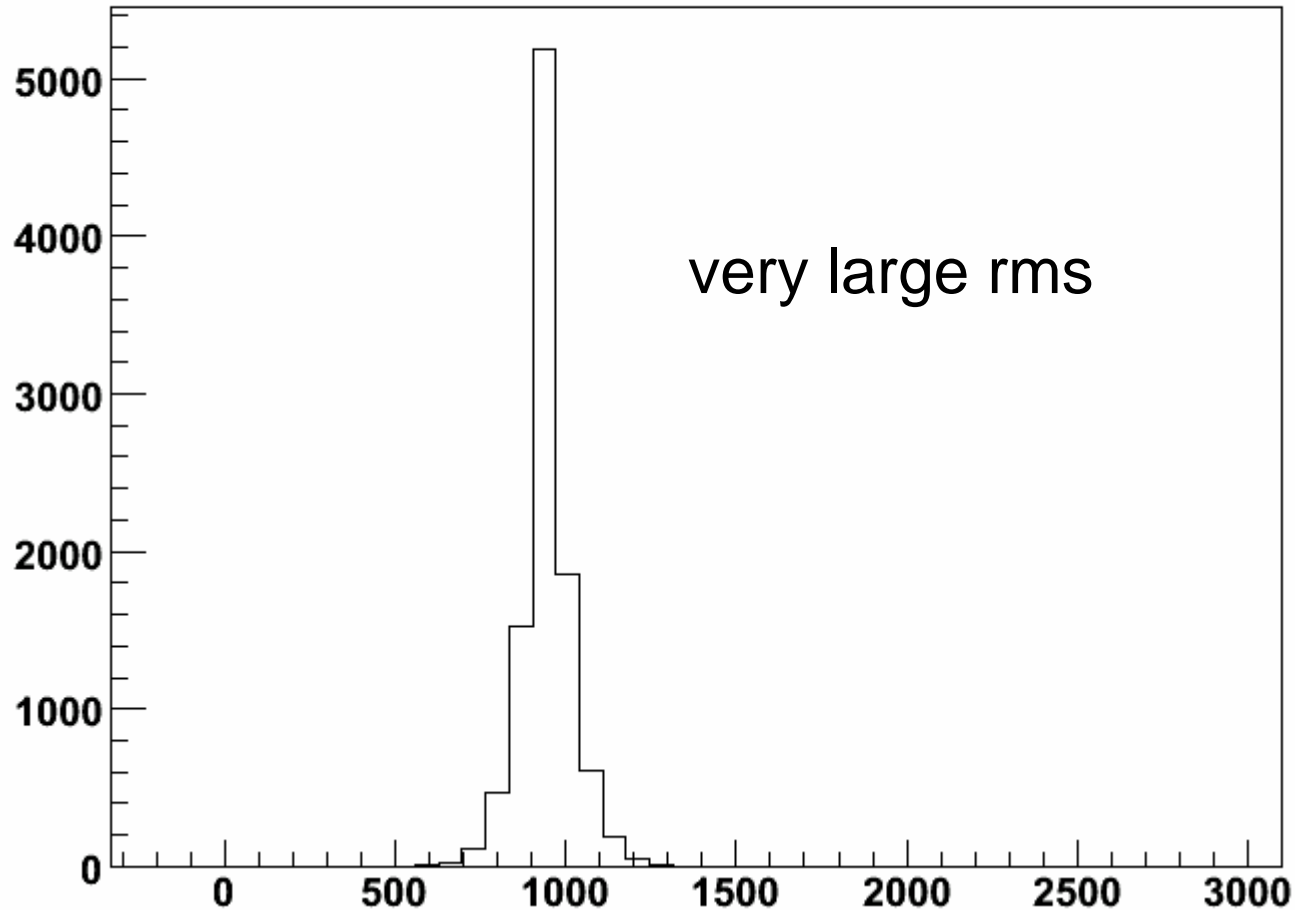


# Channel data distribution

## ■ Channel 52 of FT01 Slot05 (Front3) BarrelIC

LArDigit0 FT01 Slot05 Channel052 BarrelIC High

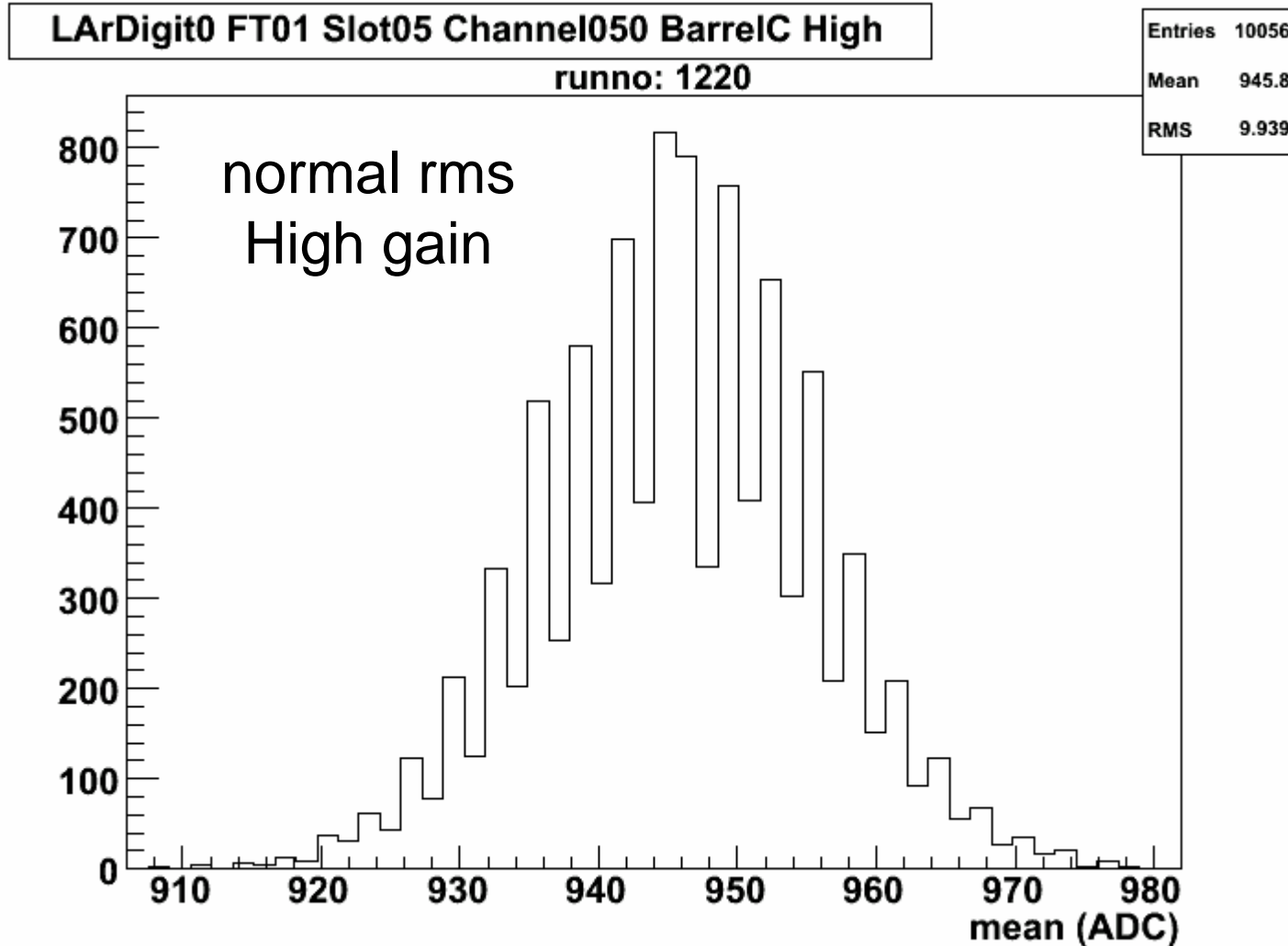
Entries 10056





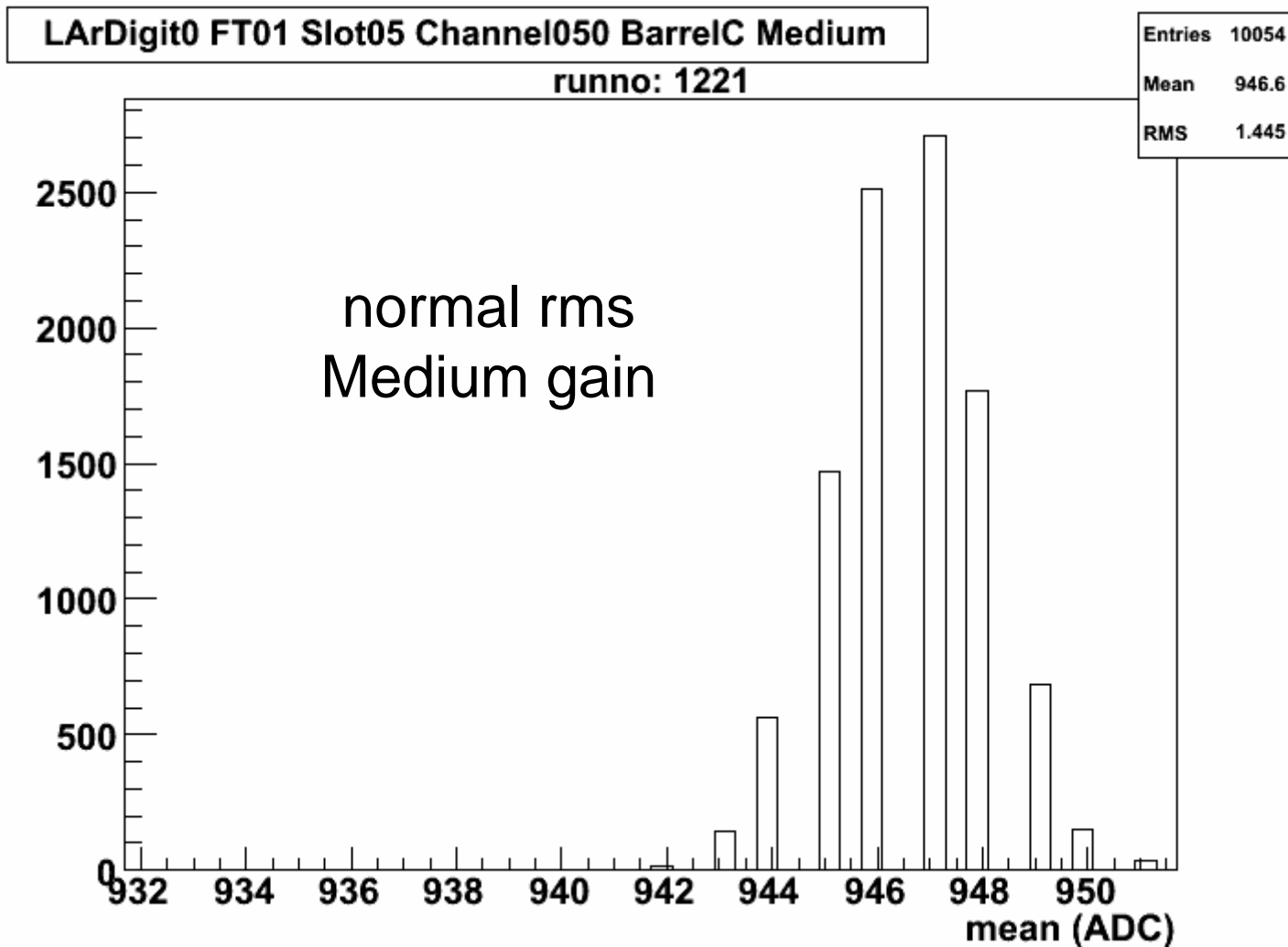
# Channel data distribution

## ■ BarrelC FT01 Slot05 (Front3) Channel 50



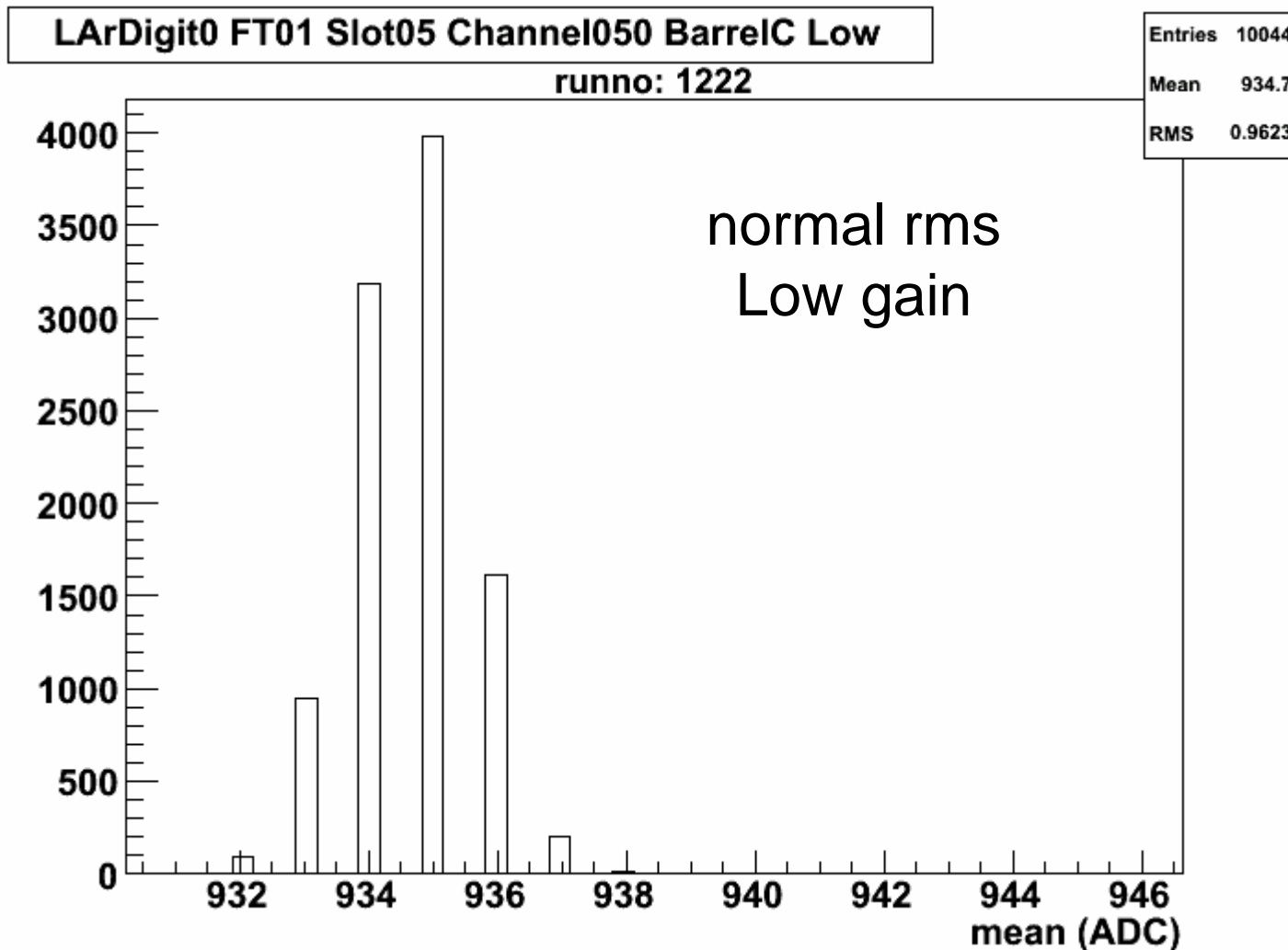
# Channel data distribution

## ■ BarrelC FT01 Slot05 (Front3) Channel 50



# Channel data distribution

## ■ BarrelC FT01 Slot05 (Front3) Channel 50



# Control the registration of expert histos

## ■ New jobOption registerExpertHistos

- turn on/off the registration of histos only for internal use
- all Sums histos (for correlations)
  - perFebSums
  - perFeedthroughSums
  - perRegionSums
- all Norm histos (to remove channels dependence in rms histos)
  - perFeedthroughNorm
  - perRegionNorm
- these histograms are not useful to people on shift

# Helper class for names

- Work on a helper class for the manipulation of string representations of HWIdentifiers
  - important to establish a standard
  - much input already received, and more expected!
- Proposal for name types to support (example for a channel)
  1. BarrelCFT03Slot05Channel087 (standard type, no spaces)
  2. BarrelC FT03 Slot05 Channel087 (standard type, spaces)
  3. BarrelCFT03Front3Channel087 (front end crate type)
  4. BarrelC FT03 Front3 Channel087 (front end crate type)
  5. /4/0/0/3/5/87/ (compact onlineID type)
- It is proposed to use type 1 for histogram names
- Proposal for cryostat ends names
  - cryostat-ends: BarrelA, BarrelC, EndcapA, EndcapC

# Front end crate FEB names

## ■ Proposal for FEB names à la ATL-A-EN-0001 (LAr cabling note):

- the cabling note ATL-A-EN-0001, figures 39 to 43, suggests an alternative naming scheme for FEBs
- seems to be widely used in the Barrel case
- unfortunately the names proposed in the note are not unique in the case of the EM: they depend on the feedthrough type. Worse, the numbering scheme in the names does not follow the offline region ordering. So a slight departure from the names etched on the baseplanes is required.
- **please see proposal at**
  - <https://twiki.cern.ch/twiki/bin/view/Atlas/CaloMonitoring>
- comments welcome!

# Summary histograms

- **Proposal: one 2D histo for each cryostat end**
  - slot(feb) vs feedthrough (as in other tools)
    - only feb's selected for monitoring are included
  - jobOption to select “warning” criteria
    - bins are 0) not monitored, 1) ok, 2) warning
    - could be extended with many types of warning if required
  - in order for criteria to apply to all concrete classes inheriting from LArNoiseMonToolBase, the proposal is to have a criteria independent of the data units. For example
    - warning if a feb has at least one channel with an rms outside a +/- % range of the mean rms for this feb
    - other criteria easy to implement
  - comments welcome!