

# FEB timing alignment for Lar partition

7 TeV collision data 2011 .

# Timing analysis setup 2011

- Stable beam lumiBlock region
- Select LB flagged green by LADleS shifters (remove LB with noise burst, HV trip )
- Remove cells which are flagged bad
- Reconstruction done with one phase (i.e. no more iteration - (not OFC iteration)) → no check on OFC iteration converging
- layer-optimize Energy cut:

New Ecut[GeV]	Layer 0	Layer 1	Layer 2	Layer 3
EMB	1	1	3	1,5
EMEC_O	1,5	1	3	2
EMEC_I	-	2	2	-
FCAL	10	10	10	10
HEC	3.5	3.5	3.5	3.5

# Time values definition

- Individual channel time (  $\langle t \rangle_{\text{channel}}$  )
  - For channels with  $> 5$  events, fit single Gaussian to the channel time distribution. Individual channel time is the mean of that fit IF:
    - The fit converges (status==successful) the FIT input param. is the median.
    - Values of the mean are not on the border of the fit range constraint
    - The fitted mean is not  $4 \cdot \text{RMS} >$  than median of the channel time distribution
  - ELSE:
    - Individual channel time is the median of the channel time distribution in a range of  $[-20,20]$ .
- FEB average time (  $\langle t \rangle_{\text{FEB}}$  )
  - For each FEB the  $\langle t \rangle_{\text{FEB}}$  is the median of all the individual channel times with more than 2 events.
  - Is calculated only if more than 10 channels are on.

# Data Set

Runs 180225, 180164

~ 40 pb-1 of collision data

~2,2 Mevents in LArCells stream

Used LArSamplesMon package with  $5\sigma$  noise cut.

FEB time offsets computed for:

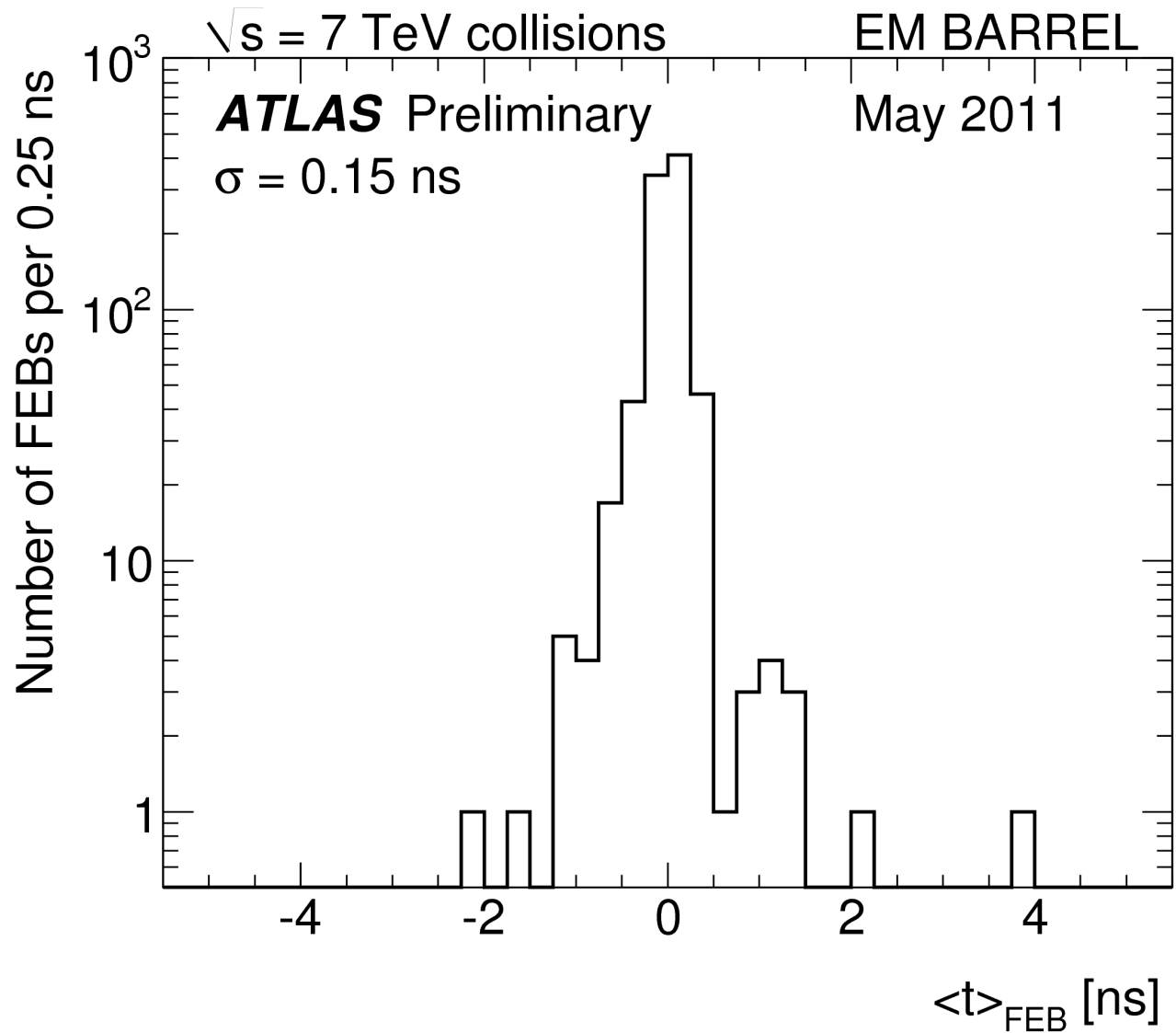
885/896 FEBs EM Barrel

550/552 FEBs EM EndCap

20/28 FEBs FCal

47/48 FEBs HEC

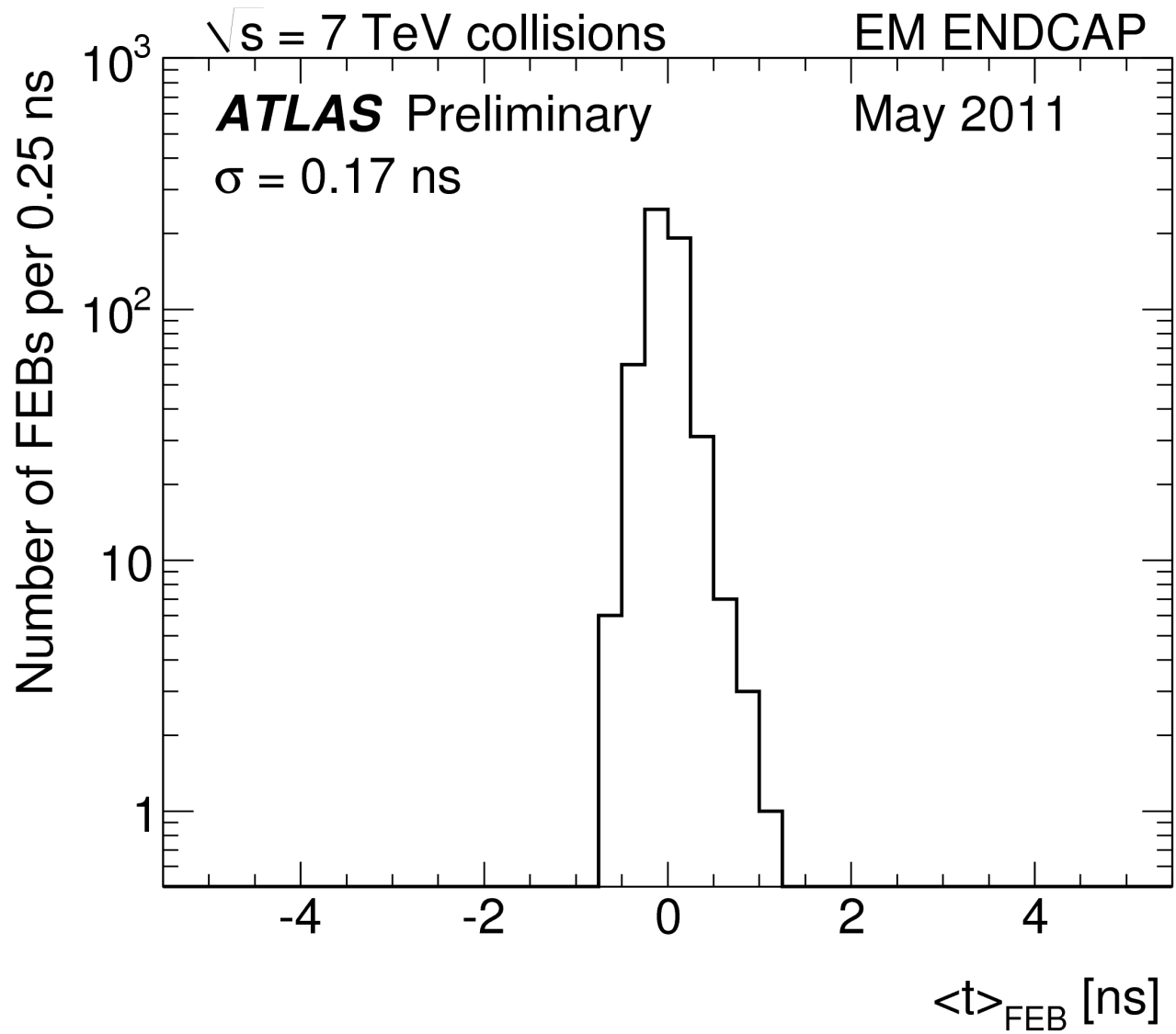
21 FEBs are missing  
1.3% tot # of FEBs



Average time per Front End Board (FEB) in EM Barrel (EMB) with 7 TeV collision data on May 2011

Most of the FEB are aligned and centered to zero. The out-layers are due to the FEBs in the third layer (7.1% of the whole number of FEB in the EMB) for which was not possible to applied correction due to low statistic.

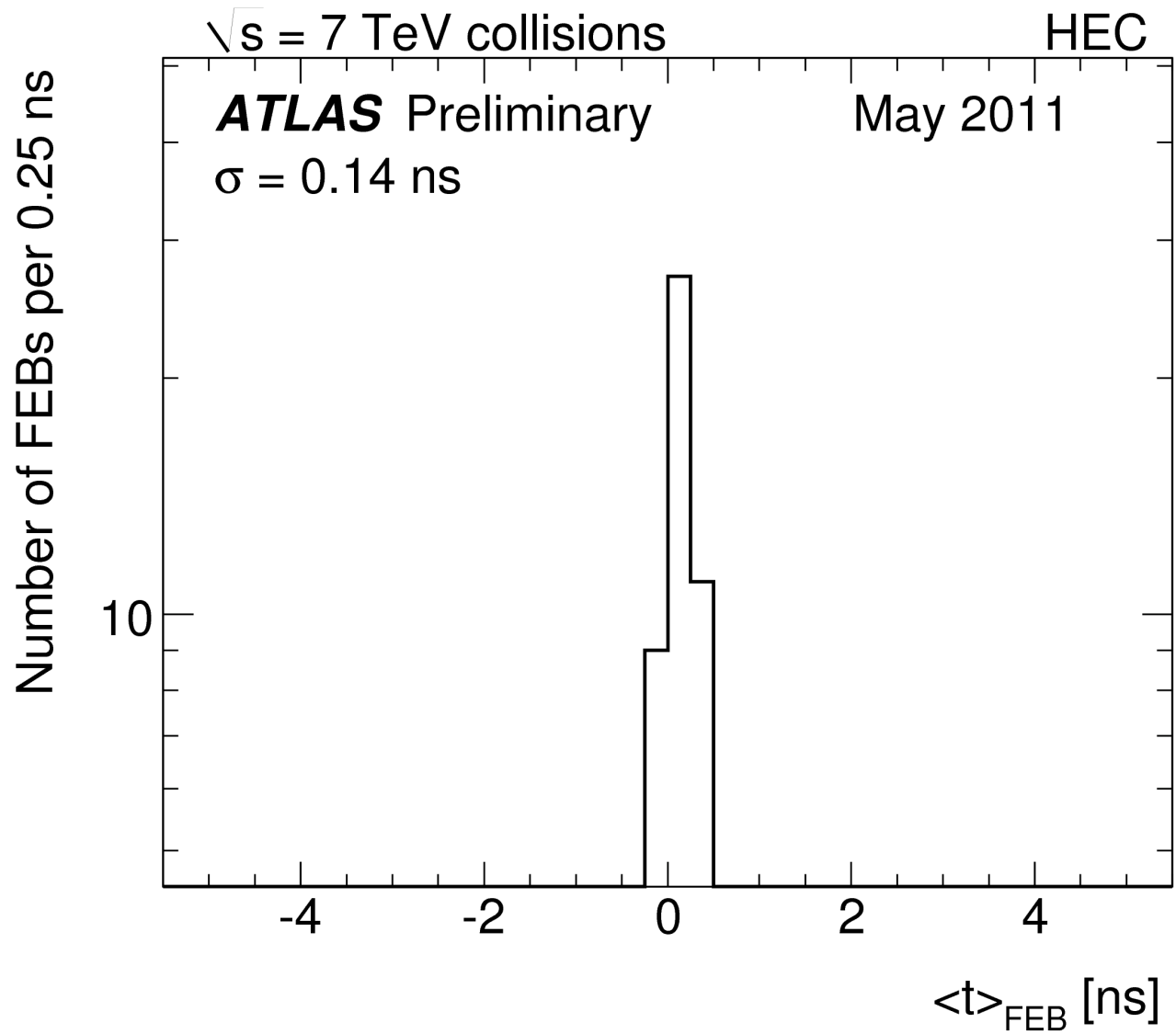
The sigma value given on the plot is the RMS of the distribution in a windows  $[-0.5 ; 0.5] \text{ ns}$ .



Average time per Front End Board (FEB) in EM ENDCAP (EMEC) with 7 TeV collision data on May 2011

The FEB are aligned and centered to zero.

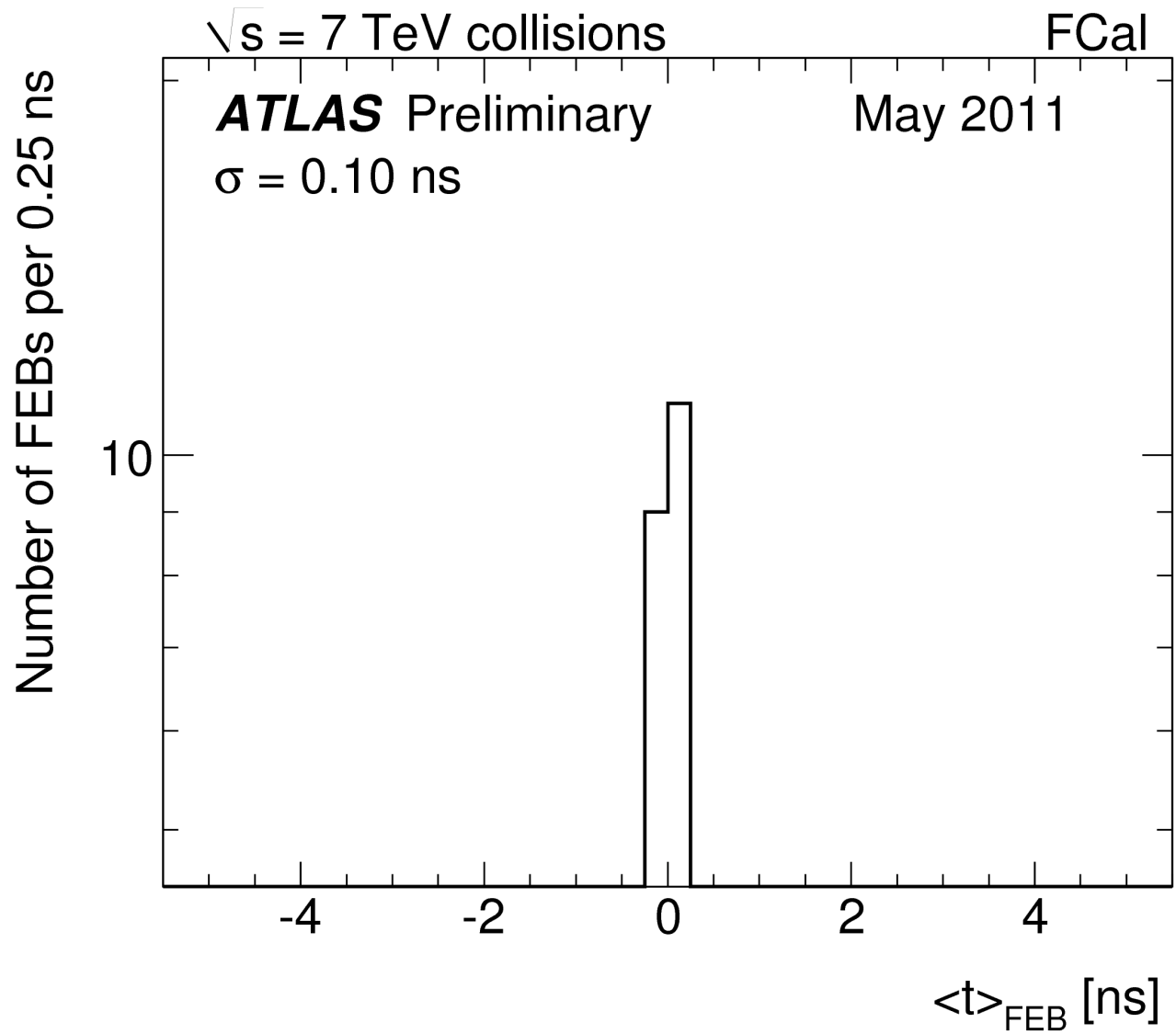
The sigma value given on the plot is the RMS of the distribution in a windows  $[-0.5 ; 0.5] \text{ ns}$ .



Average time per Front End Board (FEB) in Hadronic Endcap (HEC) with 7 TeV collision data on May 2011

The FEB are aligned and centered to zero.

The sigma value given on the plot is the RMS of the distribution in a windows  $[-0.5 ; 0.5]$  ns.



Average time per Front End Board (FEB) in Forward Calorimeter (FCal) with 7 TeV collision data on May 2011

The FEB are aligned and centered to zero.

The sigma value given on the plot is the RMS of the distribution in a windows  $[-0.5 ; 0.5] \text{ ns}$ .