# LAr Timing for 2012 Data

Data used:
2012 data at 8 TeV of center of mass energy

Ntuples used:
LArSamplesMon => run on the LArCells stream

Runs used to extract FEB time offsets:
203195-203258-203277 with 255 $pb^{-1}$

Run used to show the timing situation after correction:
203602 with 171 $pb^{-1}$

Plots shown in this document:
The average time of FEBs for each sub-detector after FEB corrections

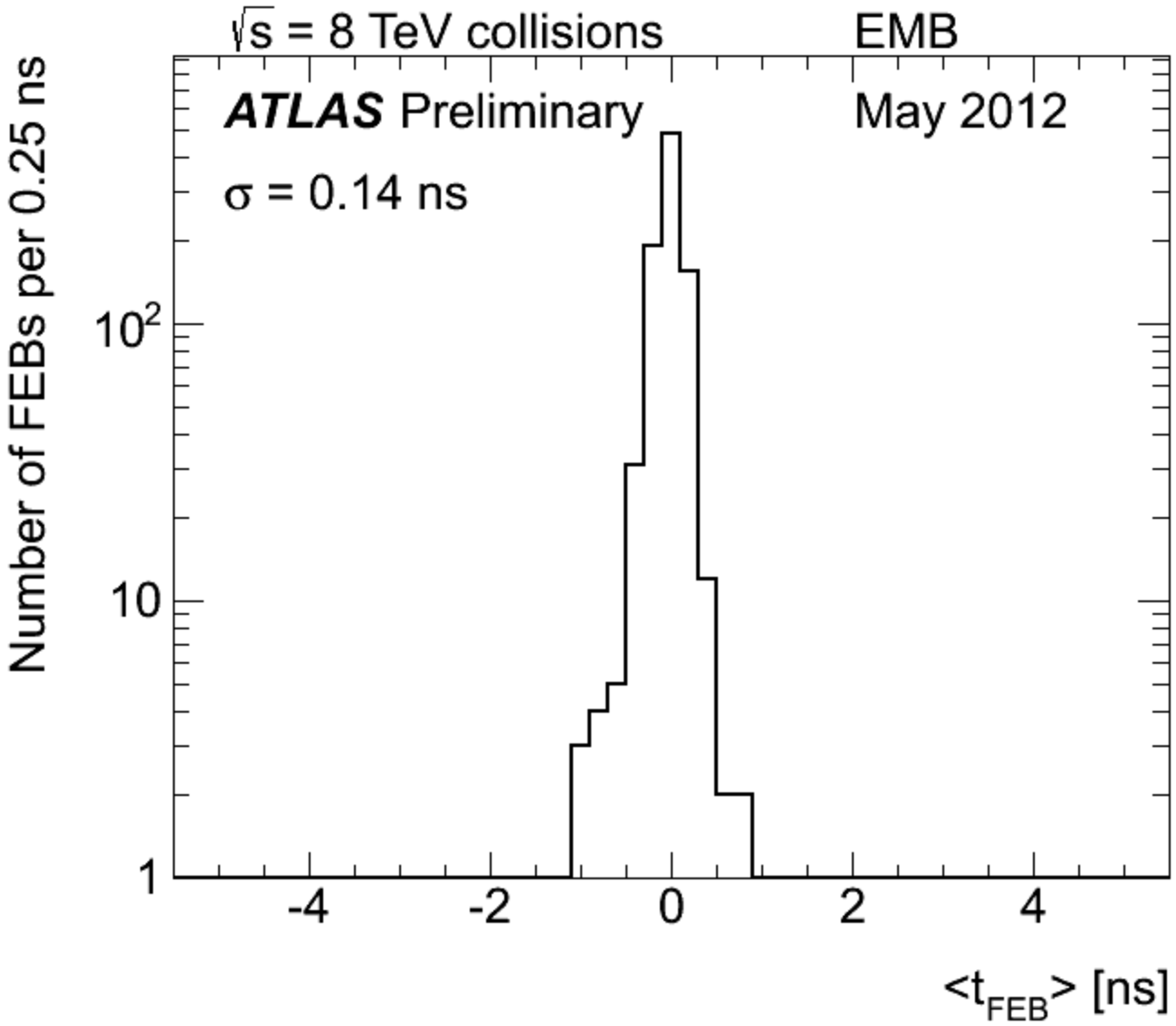
# Description of the method used to compute the FEB time

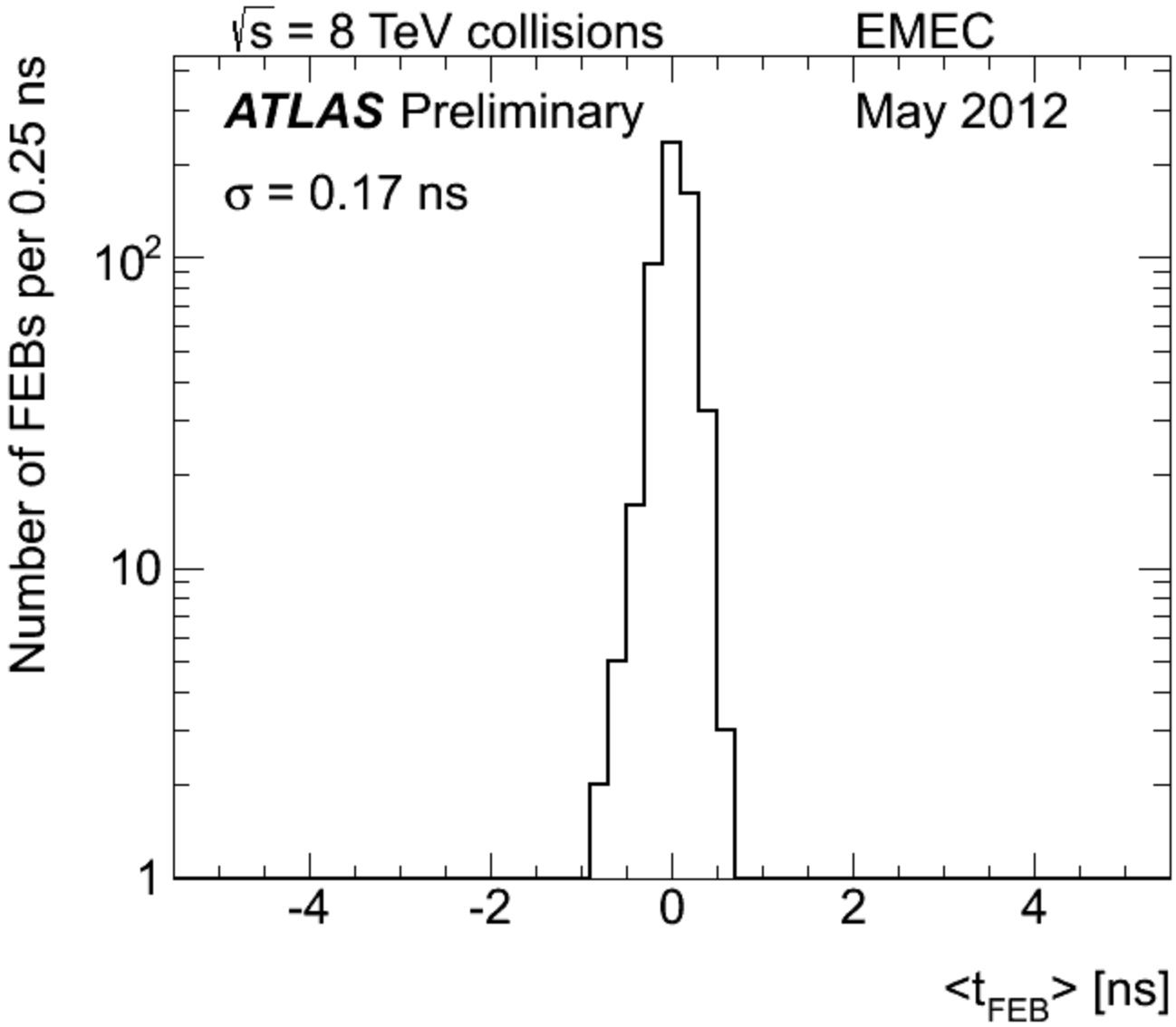
The method consists on computing the average energy weighted time for each FEB using a Gaussian fit.

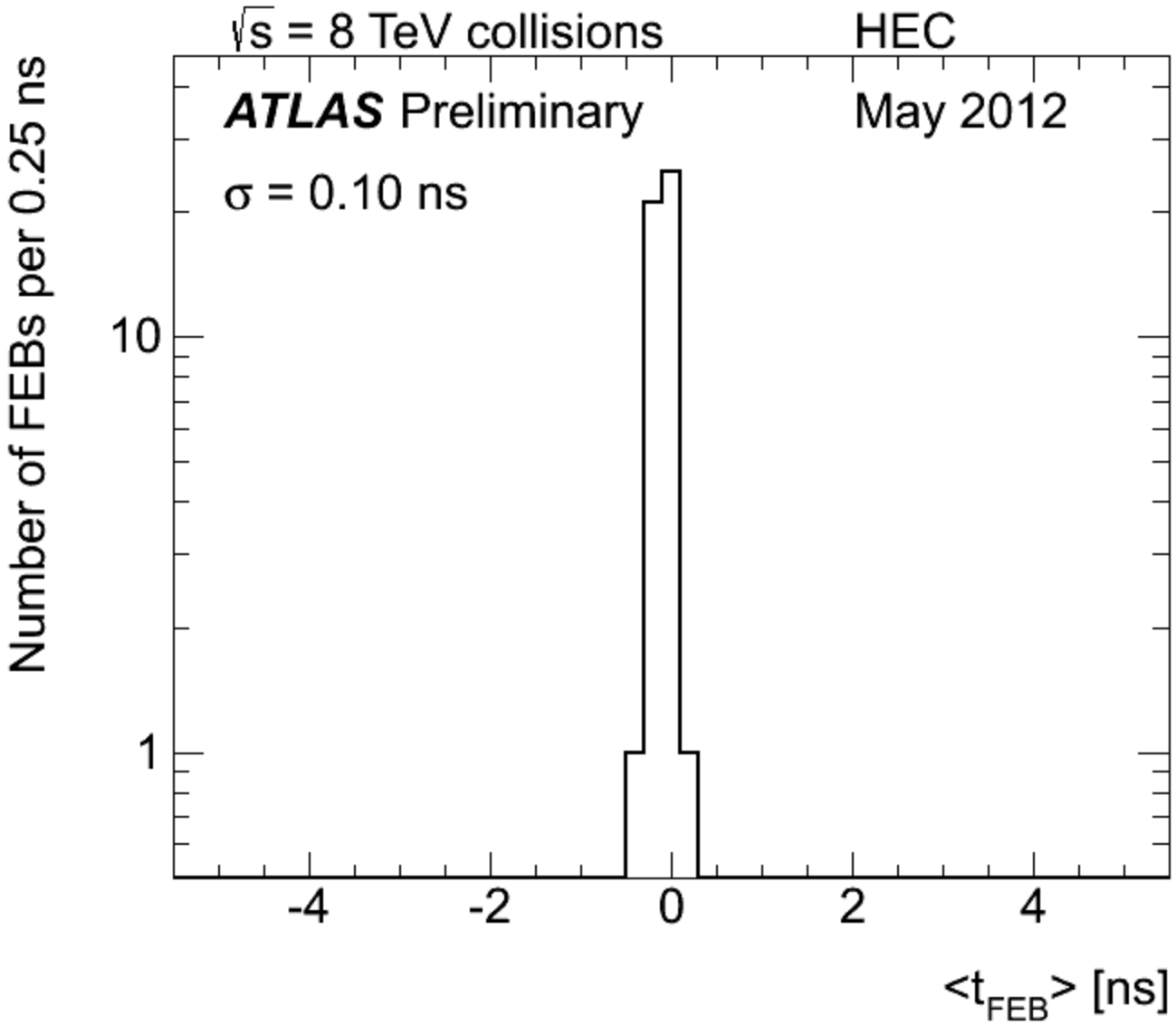
If the fit succeeds the mean of the Gaussian fit is considered as the average time of the FEB, else the median of the timing distribution per FEB is used.

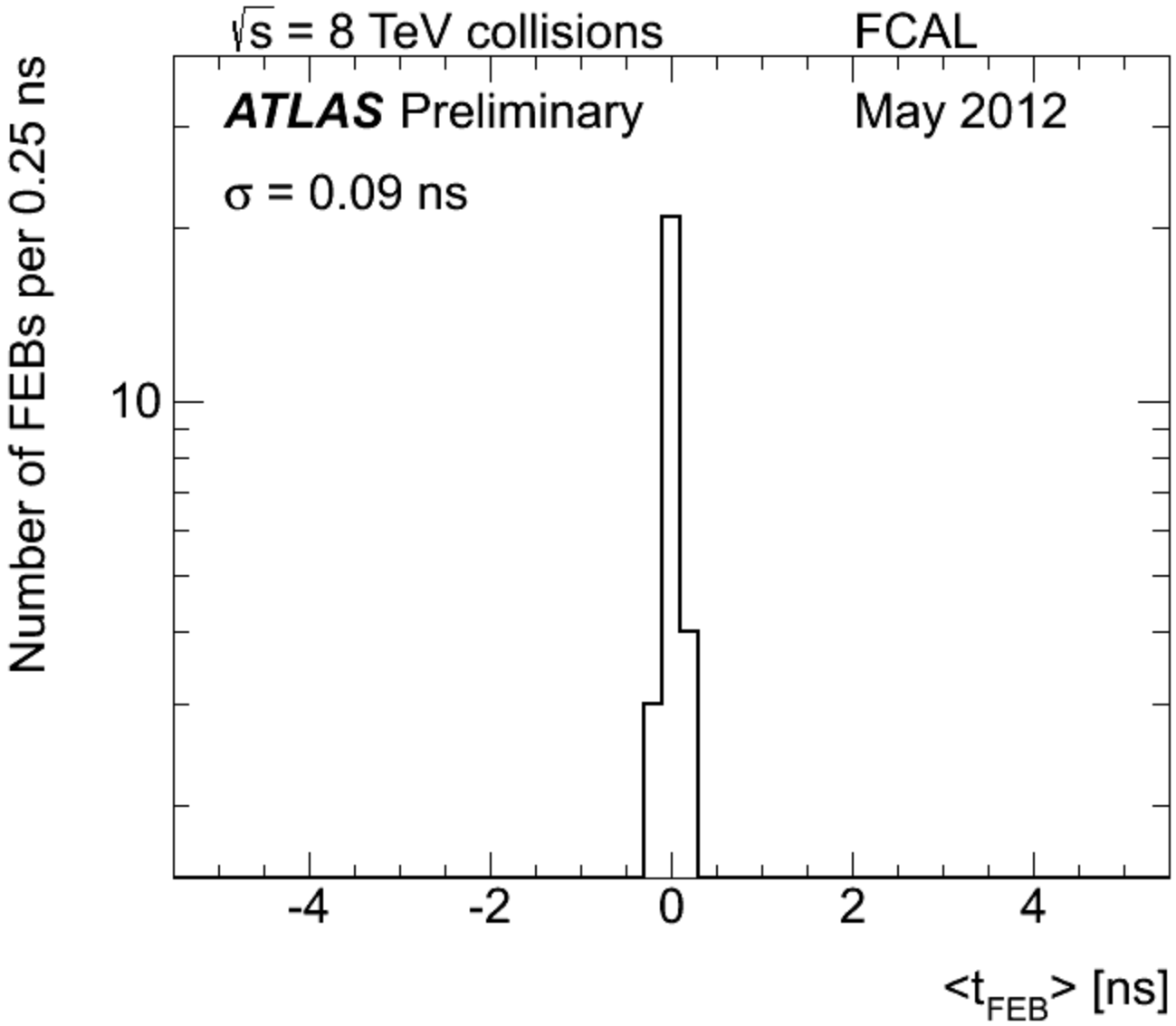
The advantage of energy weighting is that it reduces the RMS of the FEB time distributions and in some cases where the distributions have large tails, a reduction of tails is also seen.

The energy weighting provides an average time which is different by about 400ps with respect to what was done previously because of the time reconstruction energy dependence.


√s = 8 TeV collisions
EMB
ATLAS Preliminary
May 2012
σ = 0.14 ns
Number of FEBs per 0.25 ns
10²
10
1
-4
-2
0
2
4
<t_FEB> [ns]


√s = 8 TeV collisions
EMEC
ATLAS Preliminary
May 2012
σ = 0.17 ns
Number of FEBs per 0.25 ns
10²
10
1
-4
-2
0
2
4
<t_FEB> [ns]


√s = 8 TeV collisions
HEC
ATLAS Preliminary
May 2012
σ = 0.10 ns
Number of FEBs per 0.25 ns
10
1
-4
-2
0
2
4
<t_FEB> [ns]


√s = 8 TeV collisions
FCAL
ATLAS Preliminary
May 2012
σ = 0.09 ns
Number of FEBs per 0.25 ns
10
-4
-2
0
2
4
<t_FEB> [ns]

# Summary

After corrections:

The energy weighted timing is globally well aligned

The σ is estimated in the range of [-0.5, 0.5] ns and it is in the order of 100 ps in all partitions

The new method used to estimate the FEB timing seems to be stable and the situation is globally better than what it was seen in 2011

The next step would be to adjust, channel by channel, the phase of the set of optimal filtering coefficients