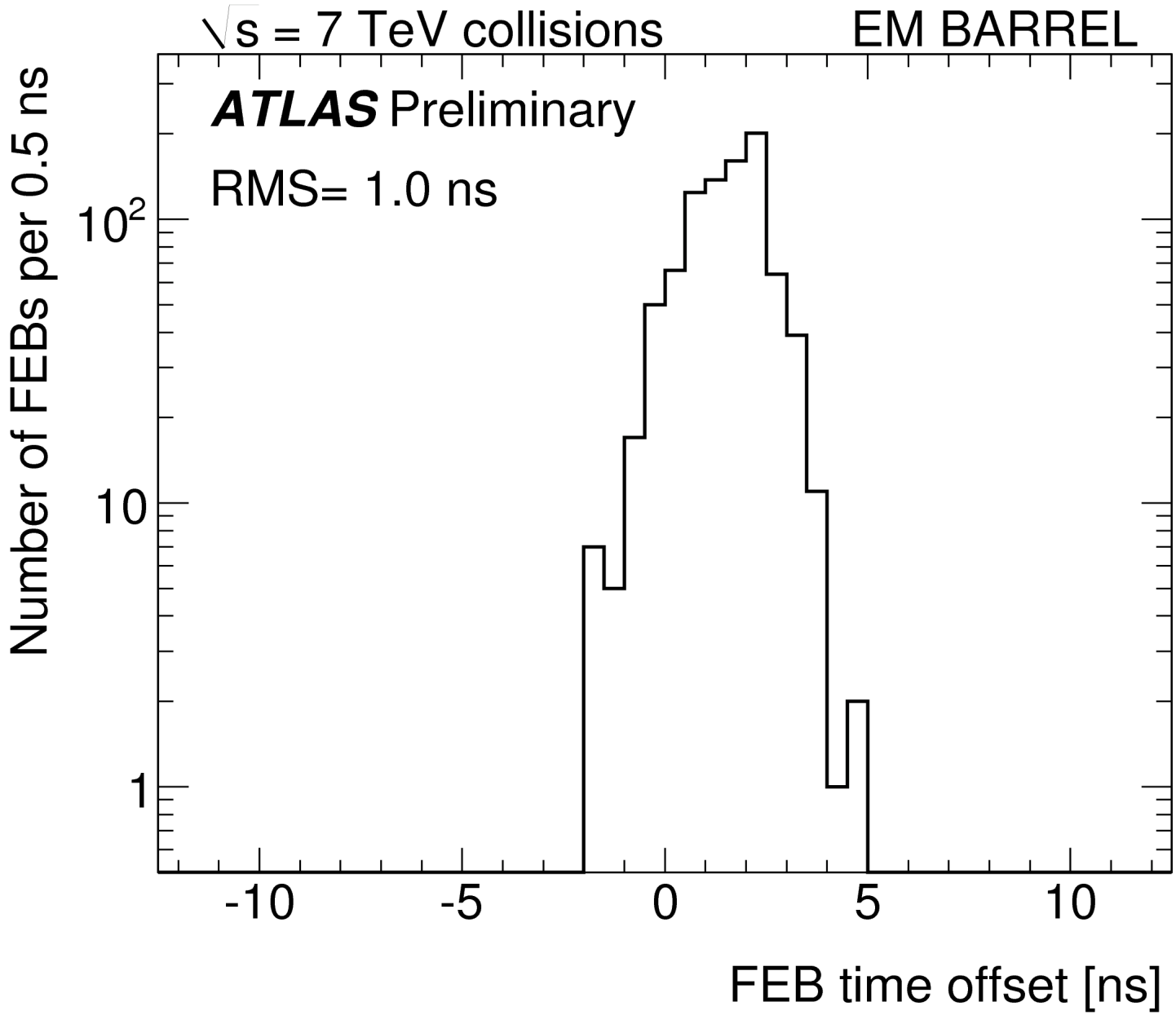
2010 collision data @ $\sqrt{s}$ = 7 TeV

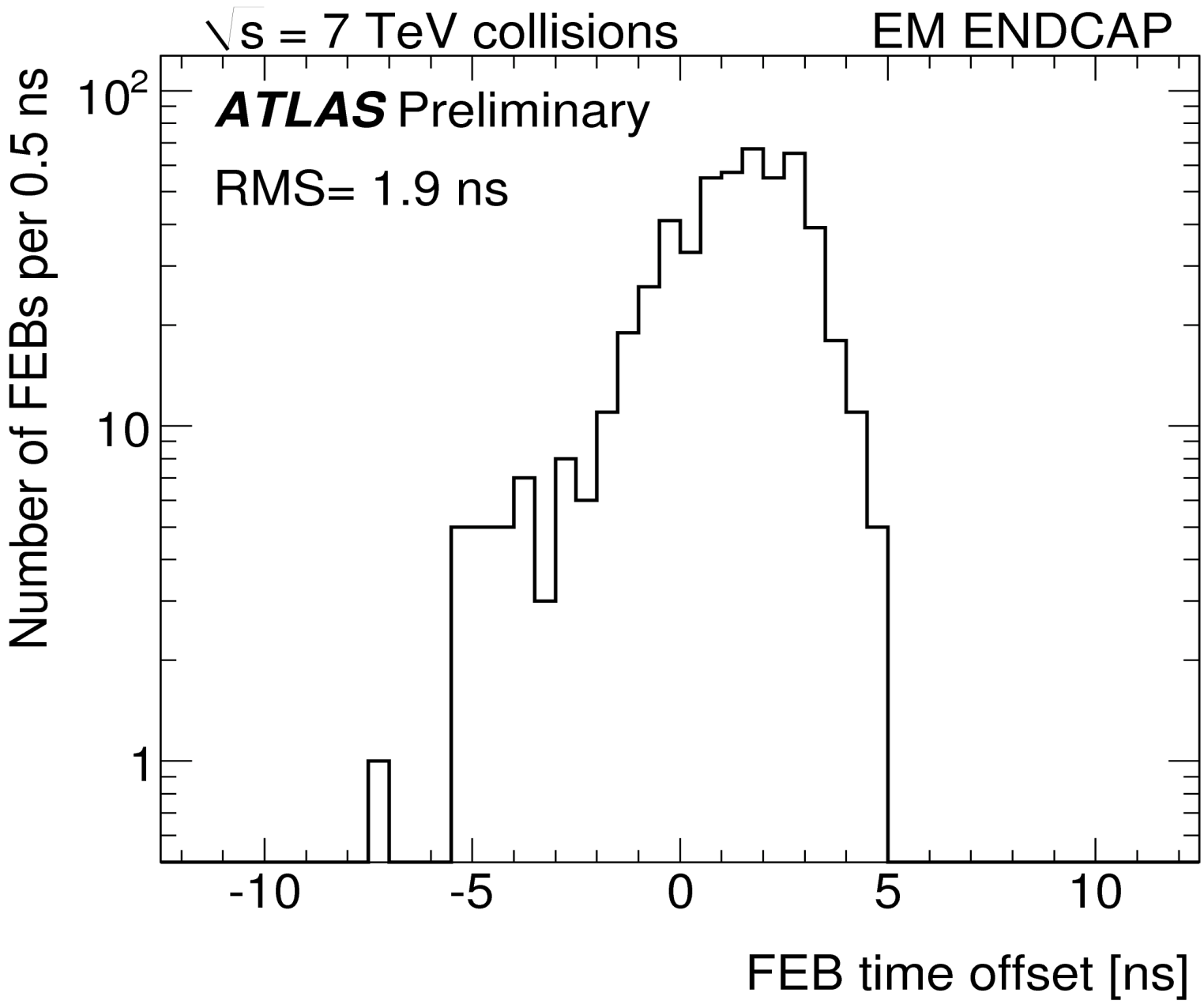
L1CaloEM stream

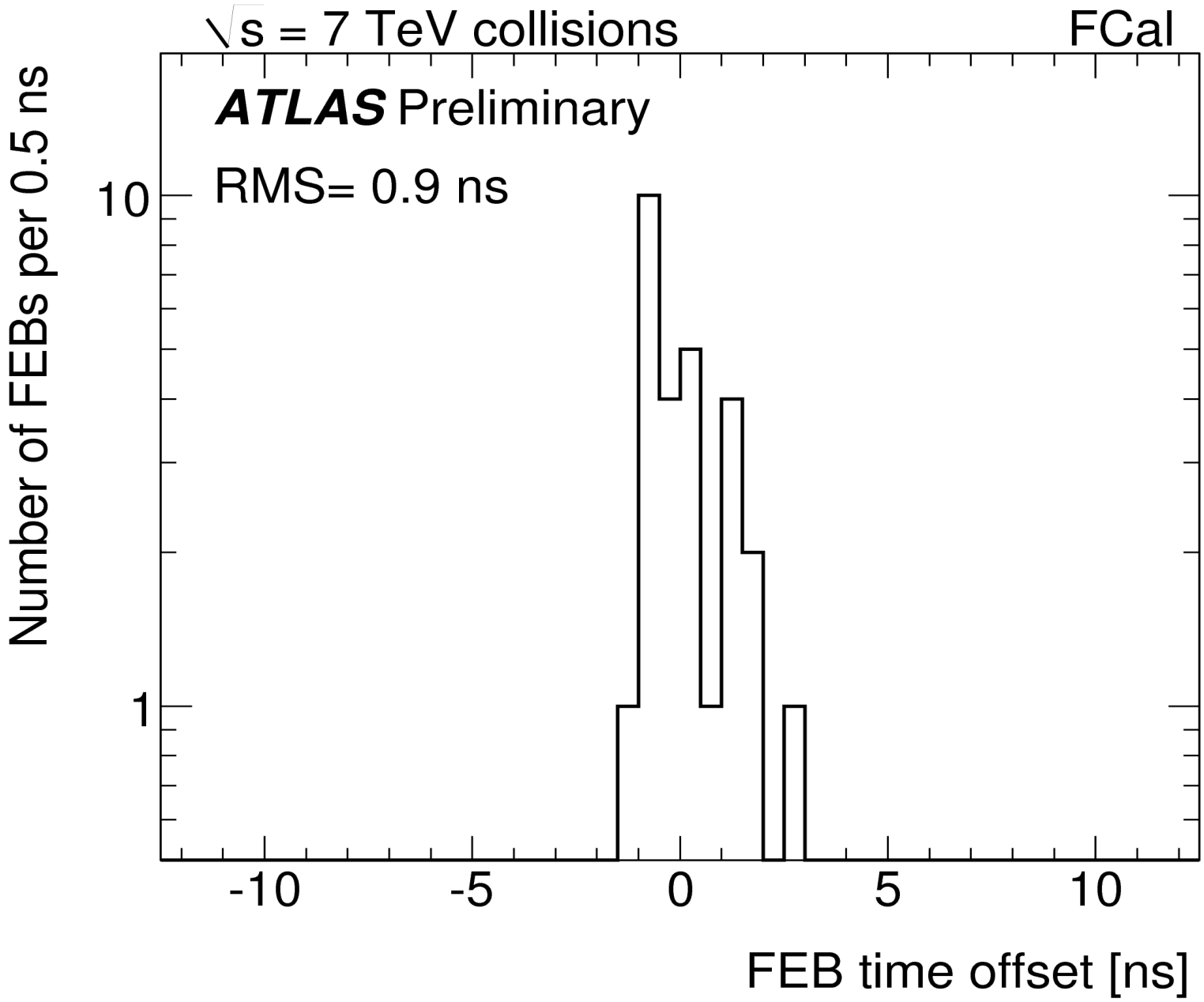
- Use LArSamplesMon ntuples (have 5σ energy noise cut)
- Runs: 152166, 152214, 152220, 152221, 152345, 152409, 152441, 152508, 152777, 152844, 152845
  ~380K events → **274.94 μb^{-1}**
- # Channels with more than 2ev 172209/182468 → 94,4 %
  - # FEBs off 20 → (1,4 % channels)

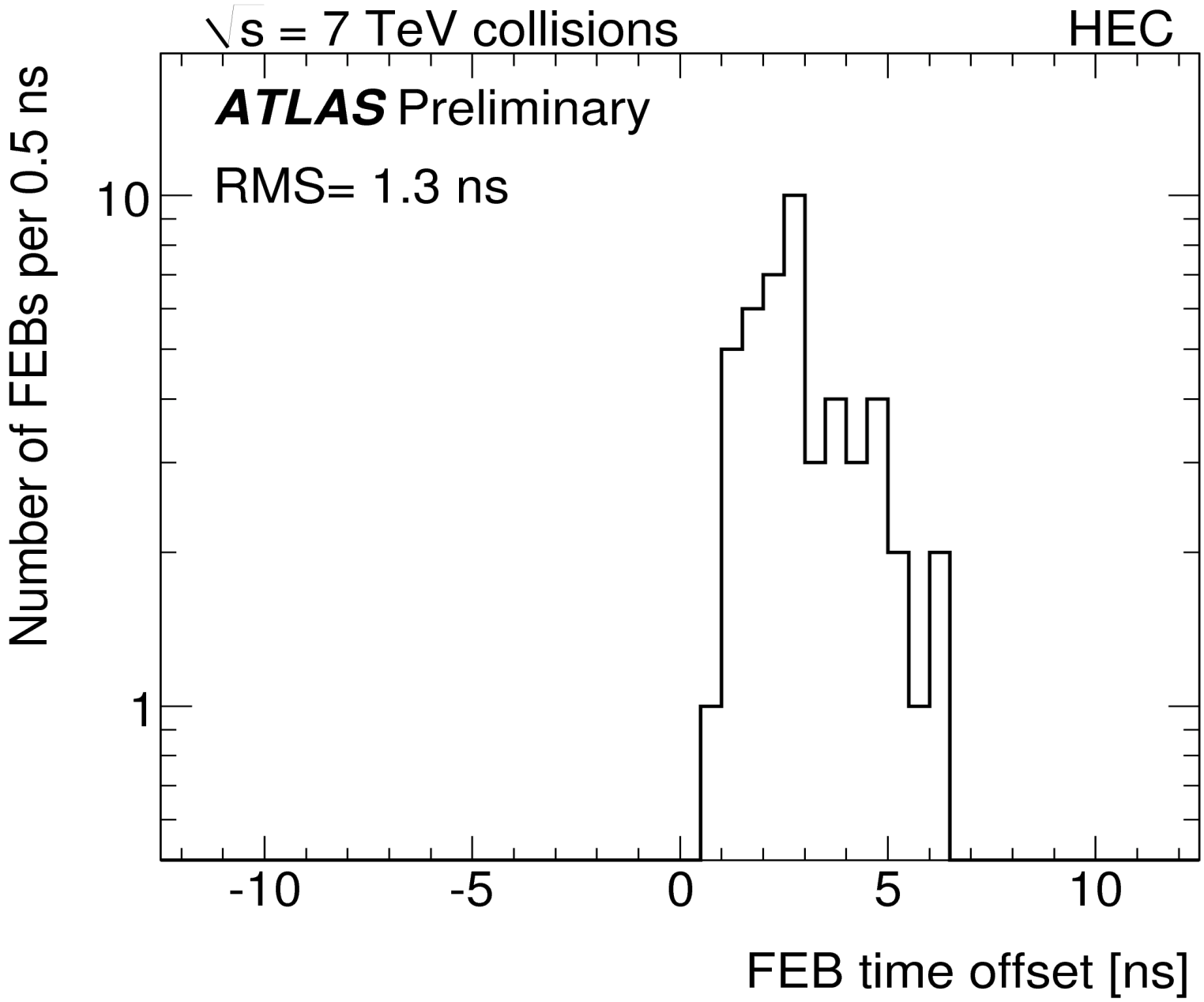
For each LAr subdetector we show the distribution of the time for all the Front End Boards.

The average time in each FEB is computed as the average of the mean time of each channels with more then 2 events.


√s = 7 TeV collisions
EM BARREL
ATLAS Preliminary
RMS= 1.0 ns
Number of FEBs per 0.5 ns
10²
10
1
-10
-5
0
5
10
FEB time offset [ns]


√s = 7 TeV collisions
EM ENDCAP
ATLAS Preliminary
RMS= 1.9 ns
Number of FEBs per 0.5 ns
10²
10
1
-10
-5
0
5
10
FEB time offset [ns]


√s = 7 TeV collisions
FCal
ATLAS Preliminary
RMS= 0.9 ns
Number of FEBs per 0.5 ns
10
1
-10
-5
0
5
10
FEB time offset [ns]


√s = 7 TeV collisions
HEC
ATLAS Preliminary
RMS= 1.3 ns
Number of FEBs per 0.5 ns
10
1
-10
-5
0
5
10
FEB time offset [ns]

Summary

Our goal is to have LAr cells to be timed in to better than 100 ps. Current values of ~1ns are quite reasonable at this stage of comissioning.

LAr timing can be adjusted in two ways:

- by setting the delay on the Front End Board (FEB) (typically for 128 channels)
- by adjusting the phase of the set of Optimal Filtering Coefficient (it is done channel by channel) used online to compute the energy and the time inside the RODs.

Up to now we have sufficient statistics to correct the FEB times.

From the run 154226 the DB was updated with new delays computed with the FEB times calculated as described below

- The <time>FEB is the average of the <time>ch of all the channels inside the FEB.
- To estimate <time>ch
  - Considered only FEB with more then 10 channel to decrease bias.
  - Use mean of the time distribution in a given channel on all the events (require at least 2 events per channel)
  - Energy cut
    - EMB0: 500 MeV, EMB1: 250 MeV, EMB2: 500 MeV, EMB3: 300 MeV
    - EMEC0: 1000 MeV, EMEC1: 500 MeV, EMEC2:1000 MeV, EMEC3:500 MeV, EMECIW1 1000 MeV, EMECIW2 1000 MeV,
    - HEC 2500 MeV, FCAL 2500 MeV
  - Use MBTS_1_1 trigger
    - MBTS_1_1 trigger selects most of the collision candidates → “eff” 80%
  - Look only @ cells with OFC iteration converging.
  - Quality flag on the pulse shape Q < 4000