ATLAS NOTE

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Stability plots for LAr electronics in 2012 running period

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Abstract

We present here plots of electronics calibration parameters, measured regularly over the running period, which should show the stability of the LAr electronics hardware. The plots do not represent the precision of electronics calibration, only the behaviour of the system itself.

Contents

1 Introduction

The plots collected in this note should serve as an illustration of the LAr electronics system stability. They are not meant to assess the precision of electronics calibration.

The data were collected over the 2012 running period in regular calibration campaigns. For the plots we have chosen 46 weekly campaigns (where all electronics parameters are measured).

The three basic parameters were choosen for plots - pedestals, electronic noise and gain. All parameters difference to a first campaign (taken on 19.3.2012) is plotted. Pedestals (electronics baseline) are displayed as absolute difference of ADC counts, noise and gain are plotted as relative difference in per mil. Every parameter is plotted separately for each gain used (high, medium low) and separately per LAr subdetector (EM, HEC, FCAL).

For each FEB (128 readout channels) the average over all channels is computed and compared with the reference, making one entry in the plot. This procedure shows the stability of the system, not the stability of the individual channels, which is studied elsewhere. We expect, that any coherent drift of the system is better visible on per FEB mean values, which are more stable against statistical and random fluctuations.

All plots consists of two parts, a 2D plot of individual differences, where the time development could be seen, and of projection of this 2D plot to Y-axis, showing the global distribution of differences.

2 Pedestal

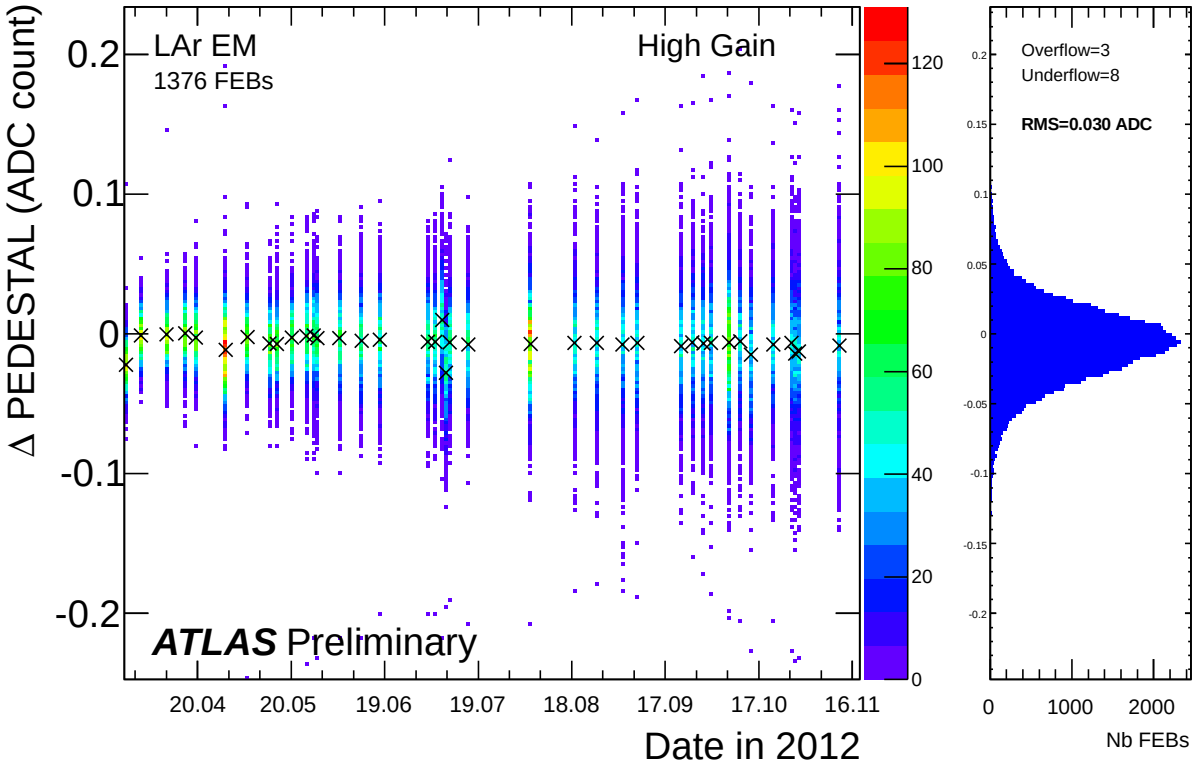

Figure 1: High gain EM pedestal stability.

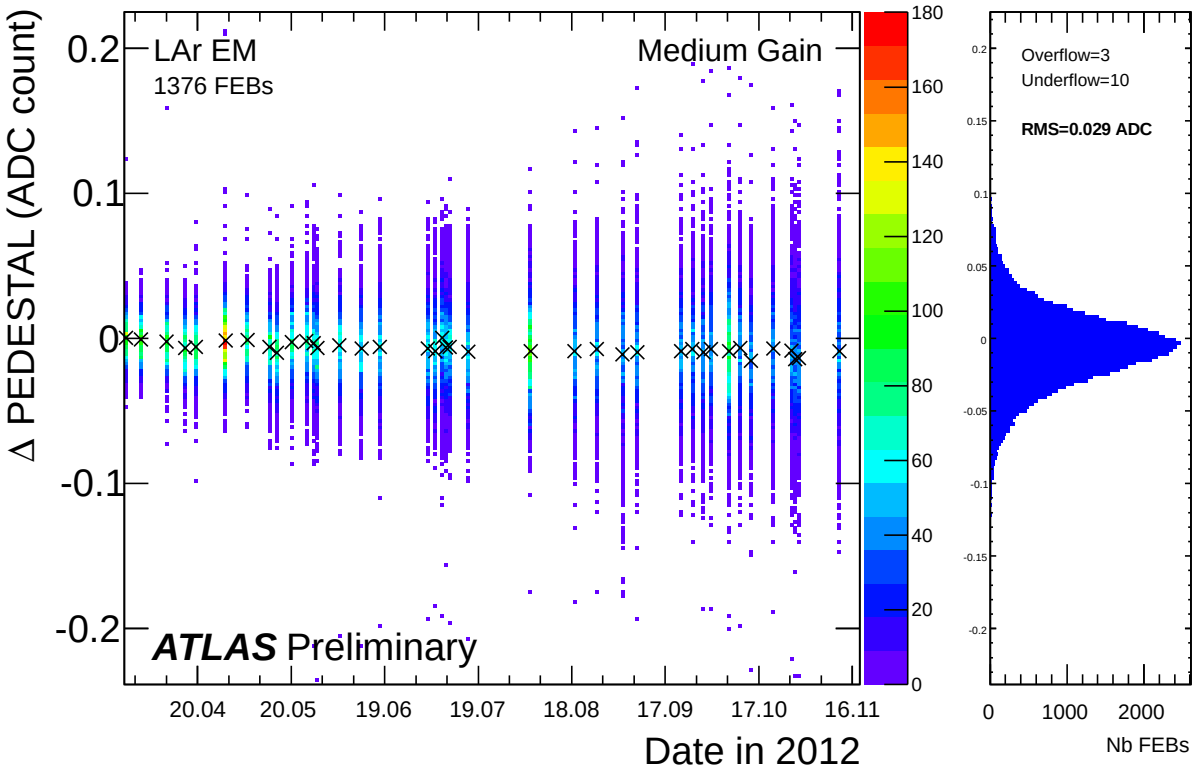

Figure 2: Medium gain EM pedestal stability.

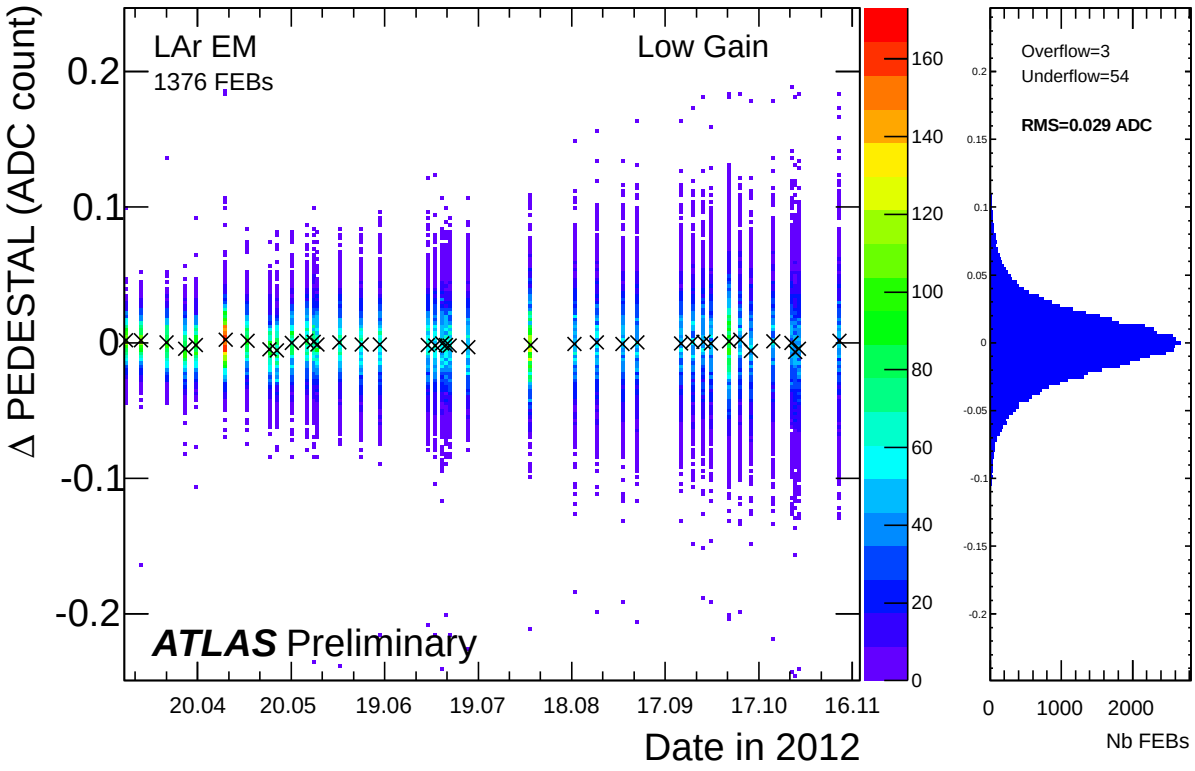

Figure 3: Low gain EM pedestal stability.

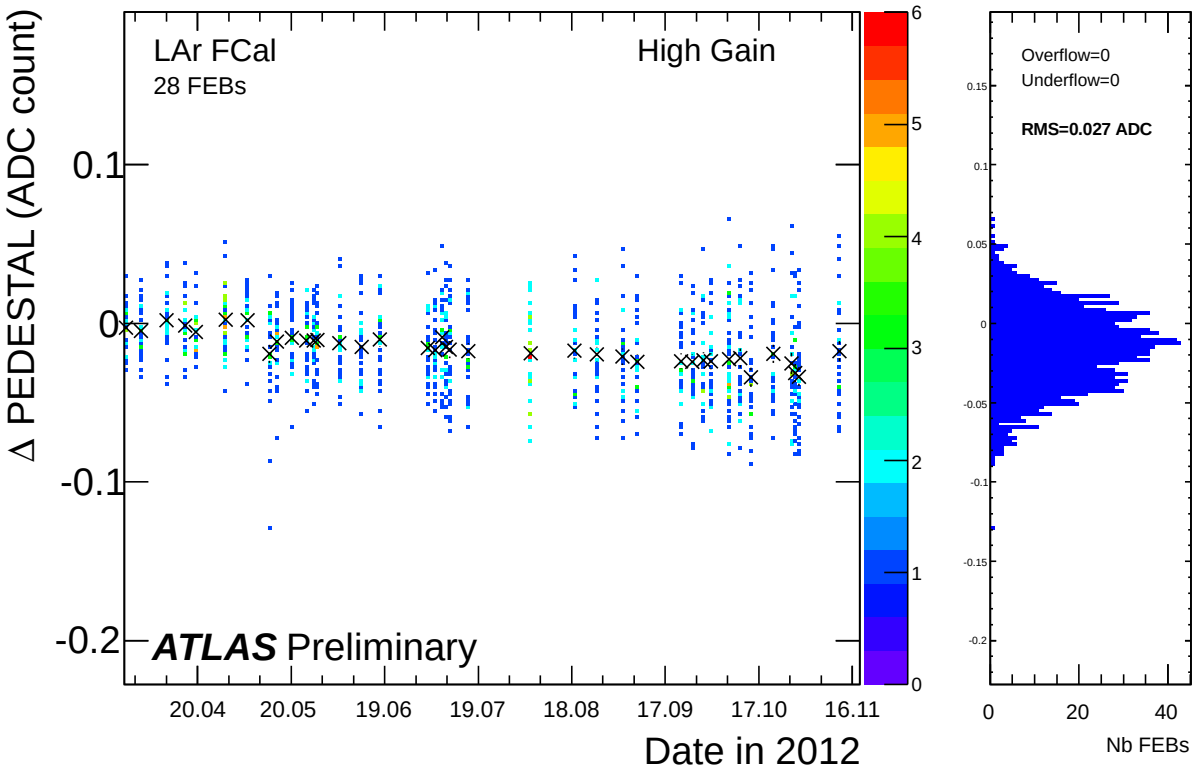

Figure 4: High gain FCAL pedestal stability.

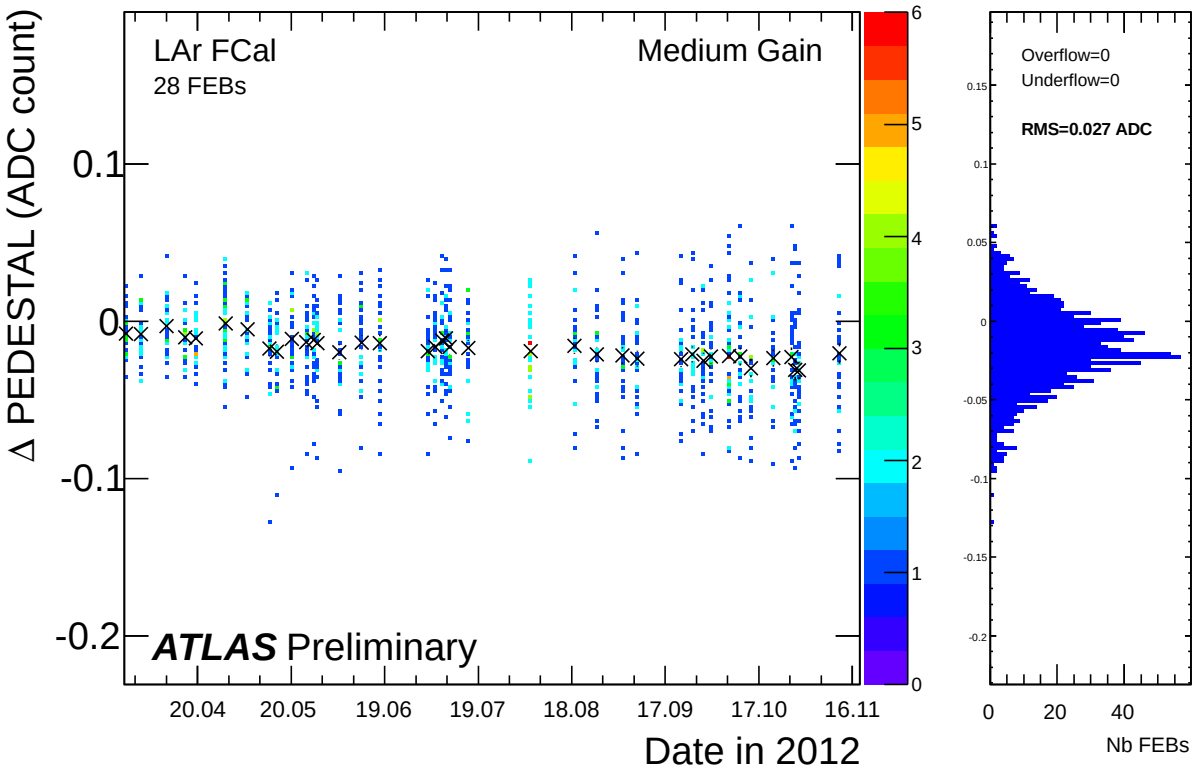

Figure 5: Medium gain FCAL pedestal stability.

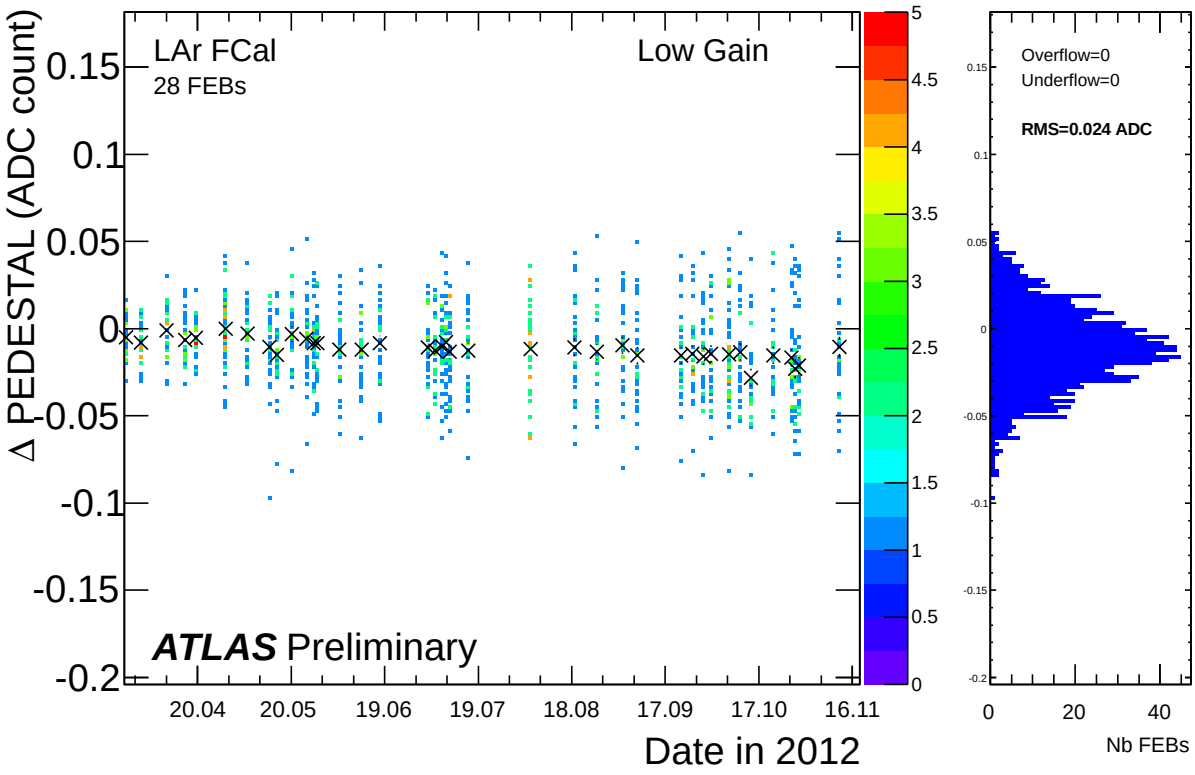

Figure 6: Low gain FCAL pedestal stability.

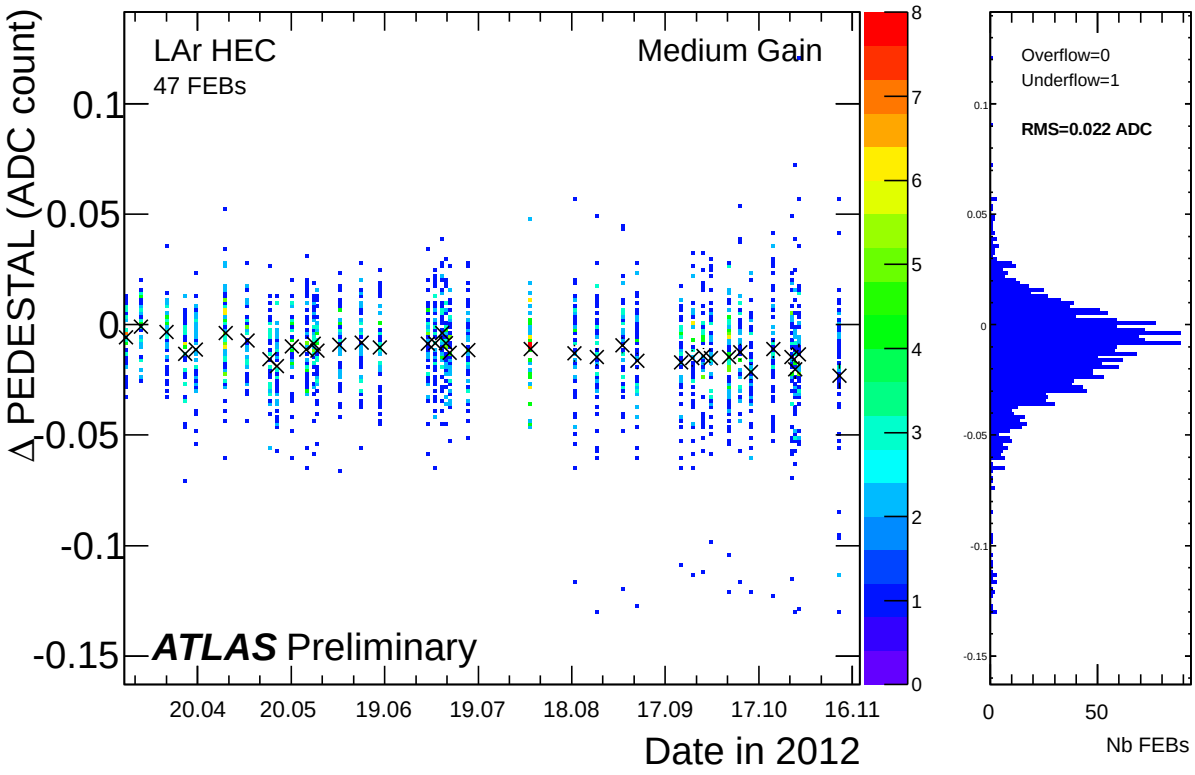

Figure 7: Medium gain HEC pedestal stability.

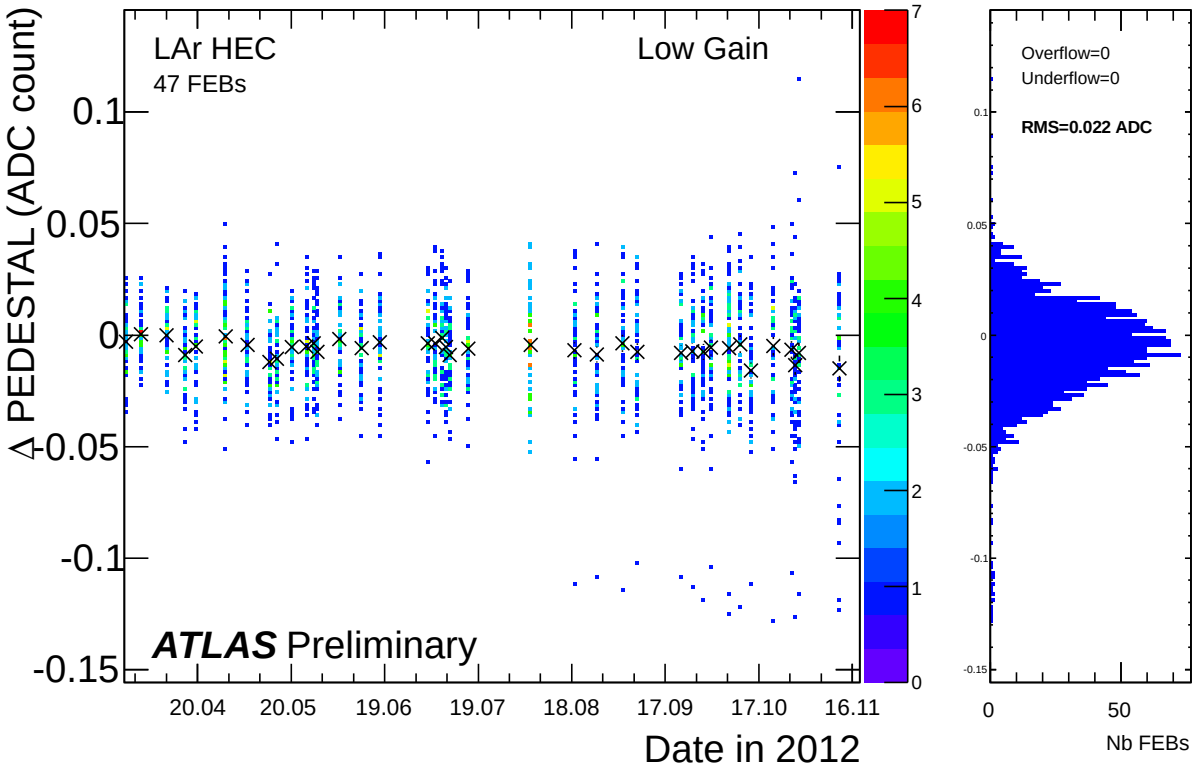

Figure 8: Low gain HEC pedestal stability.

3 Noise

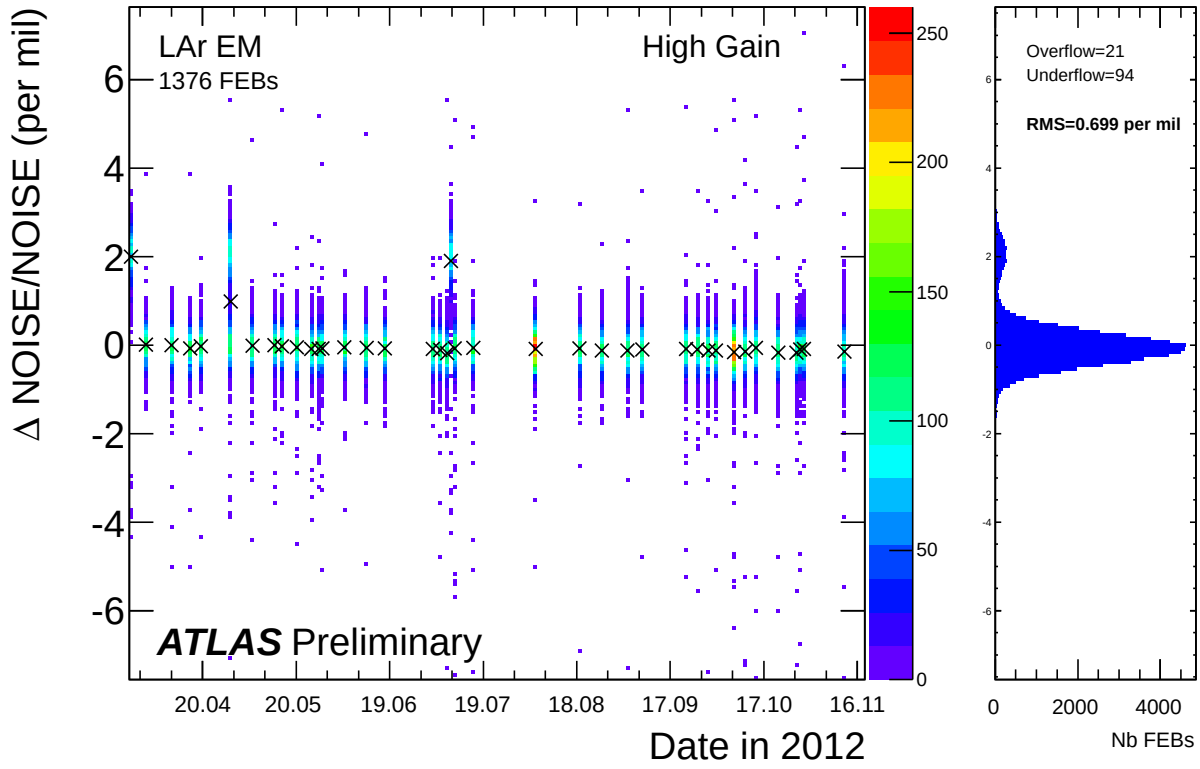

Figure 9: High gain EM noise stability.

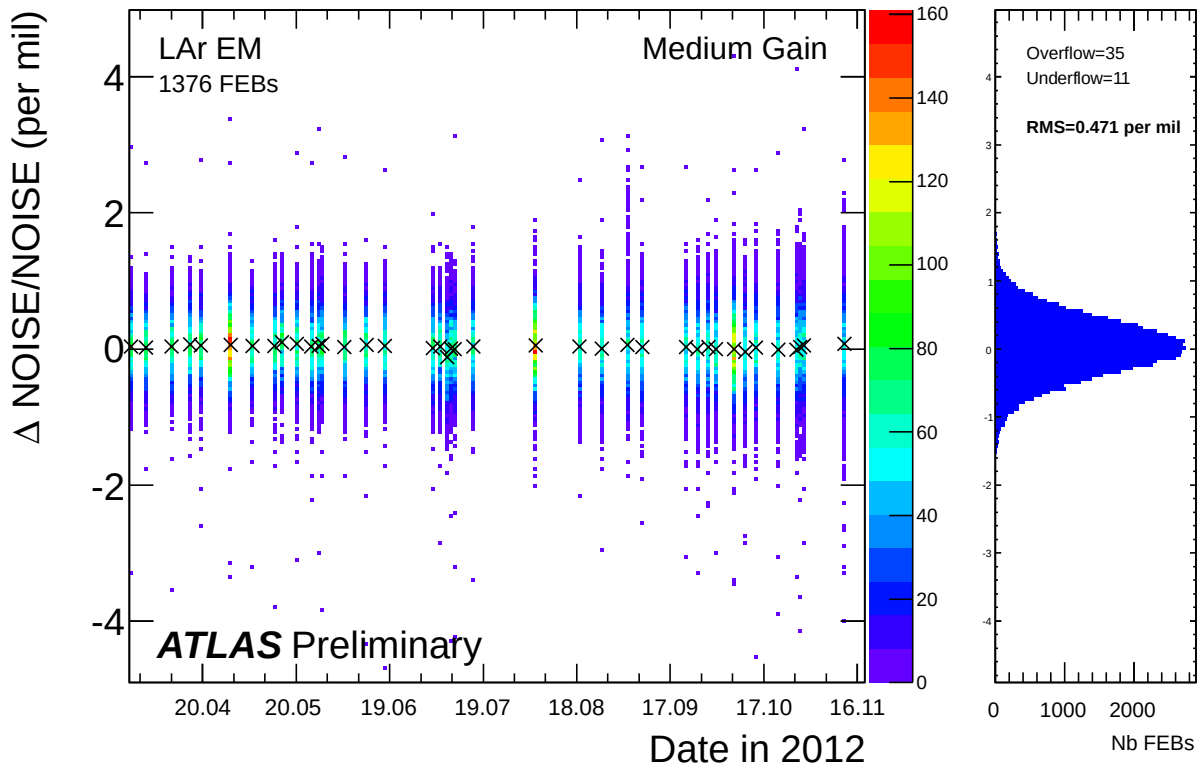

Figure 10: Medium gain EM noise stability.

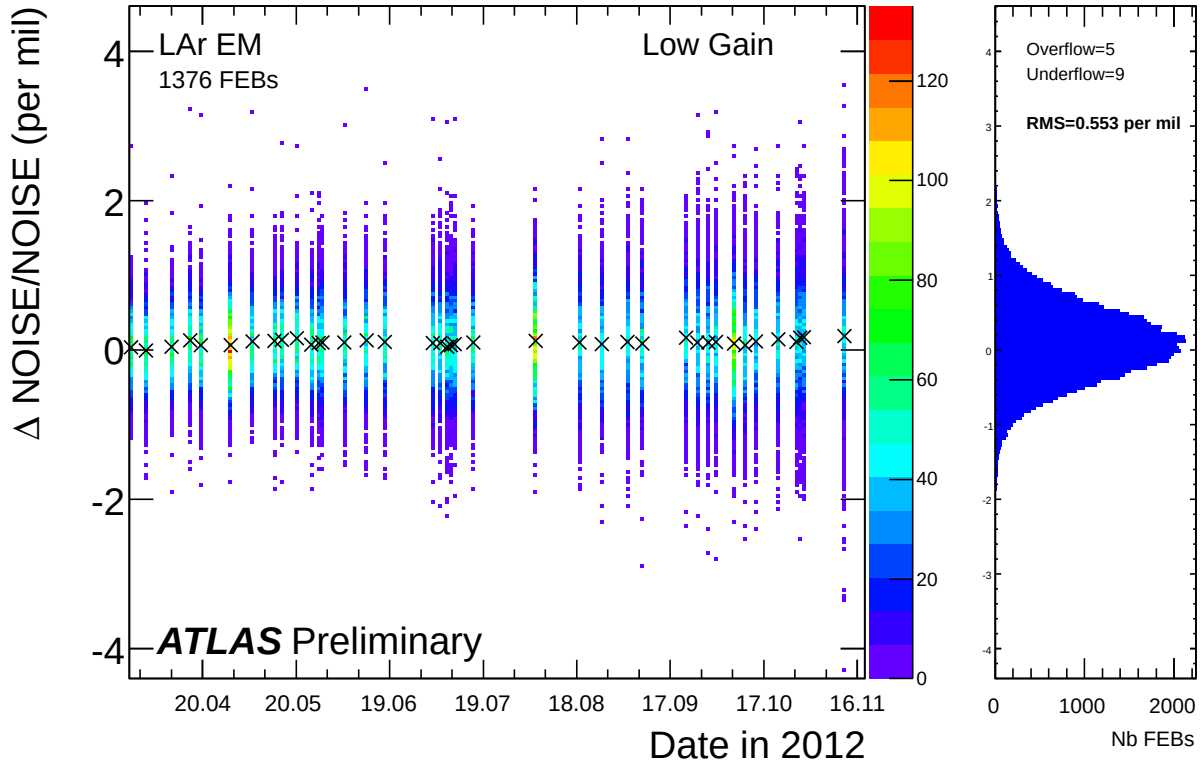

Figure 11: Low gain EM noise stability.

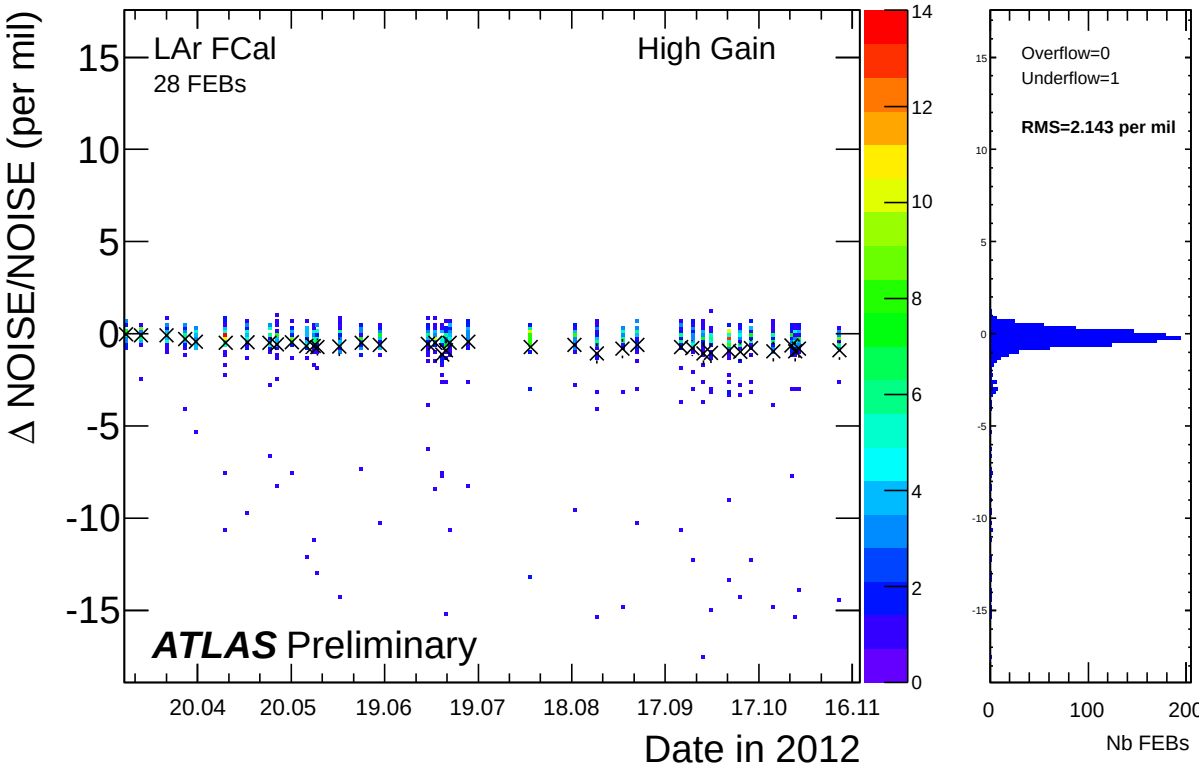

Figure 12: High gain FCAL noise stability.

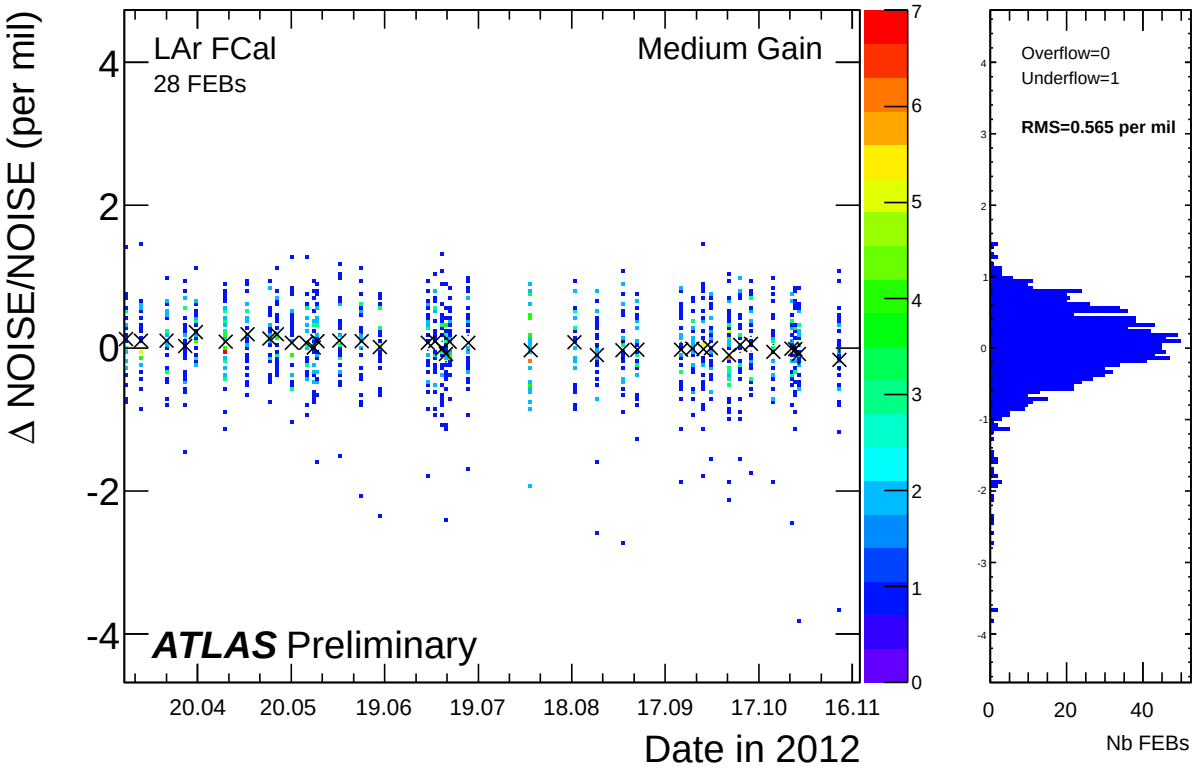

Figure 13: Medium gain FCAL noise stability.

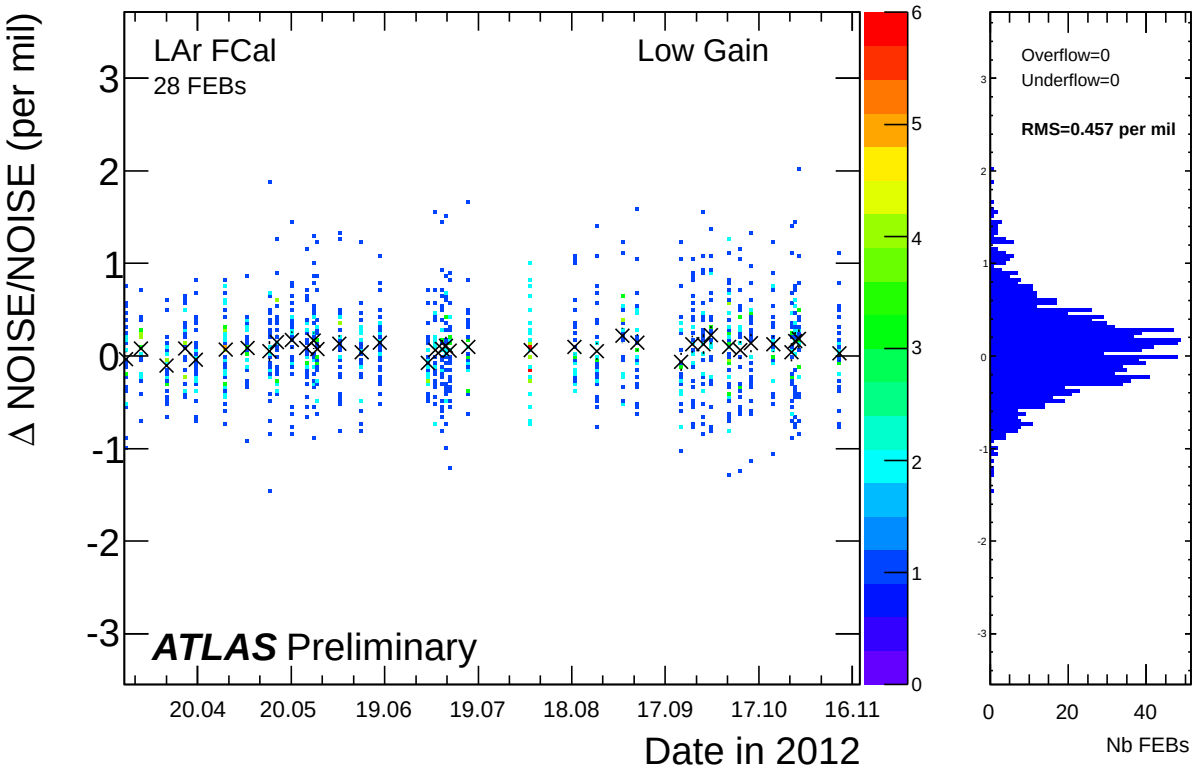

Figure 14: Low gain FCAL noise stability.

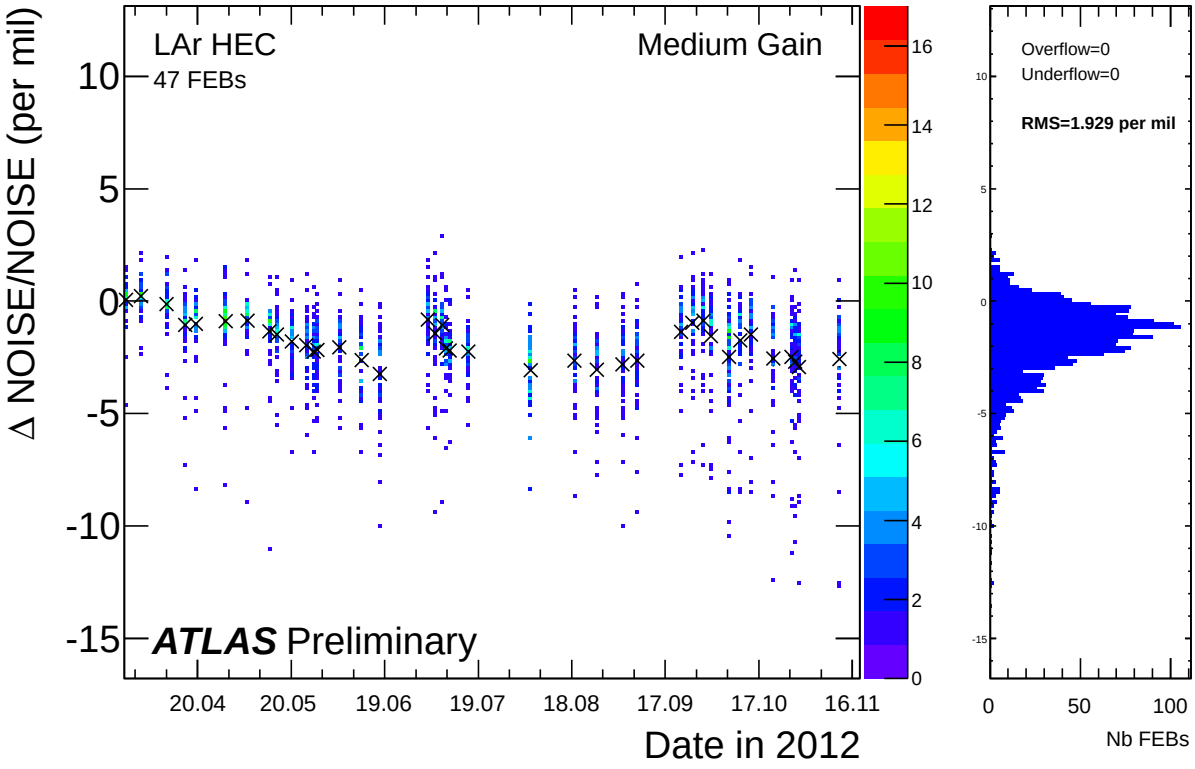

Figure 15: Medium gain HEC noise stability.

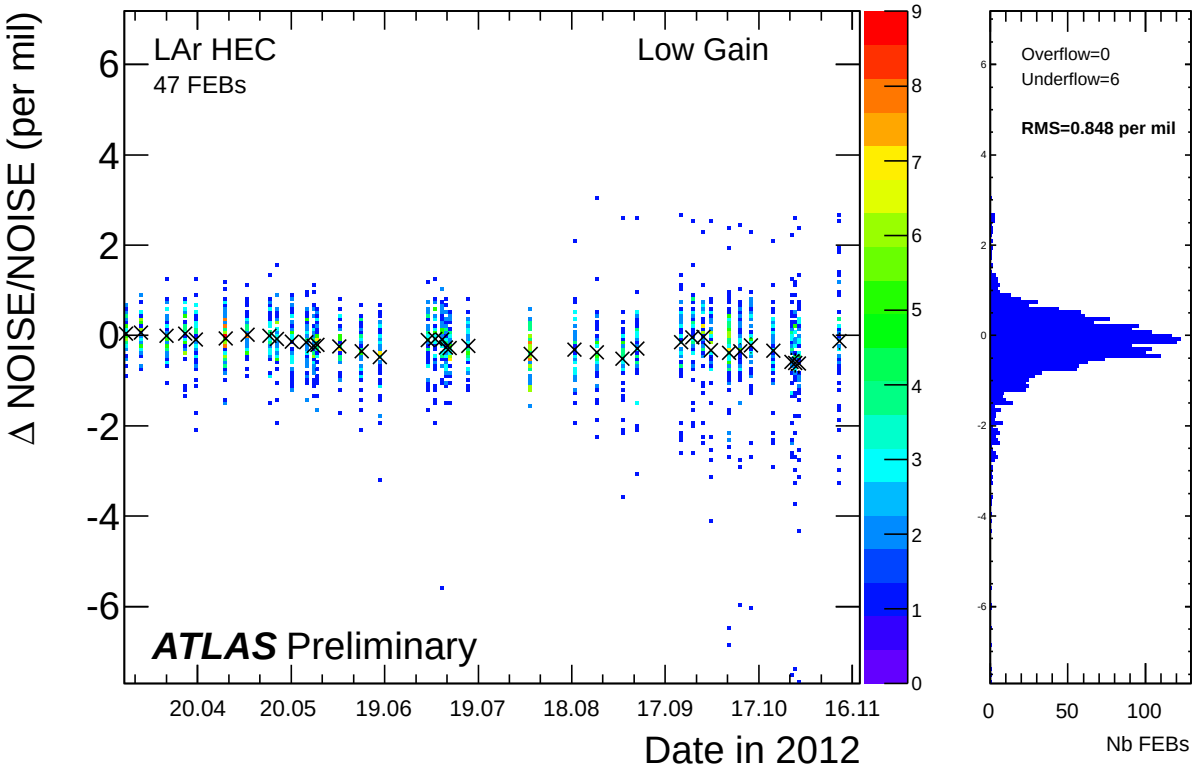

Figure 16: Low gain HEC noise stability.

4 Gain

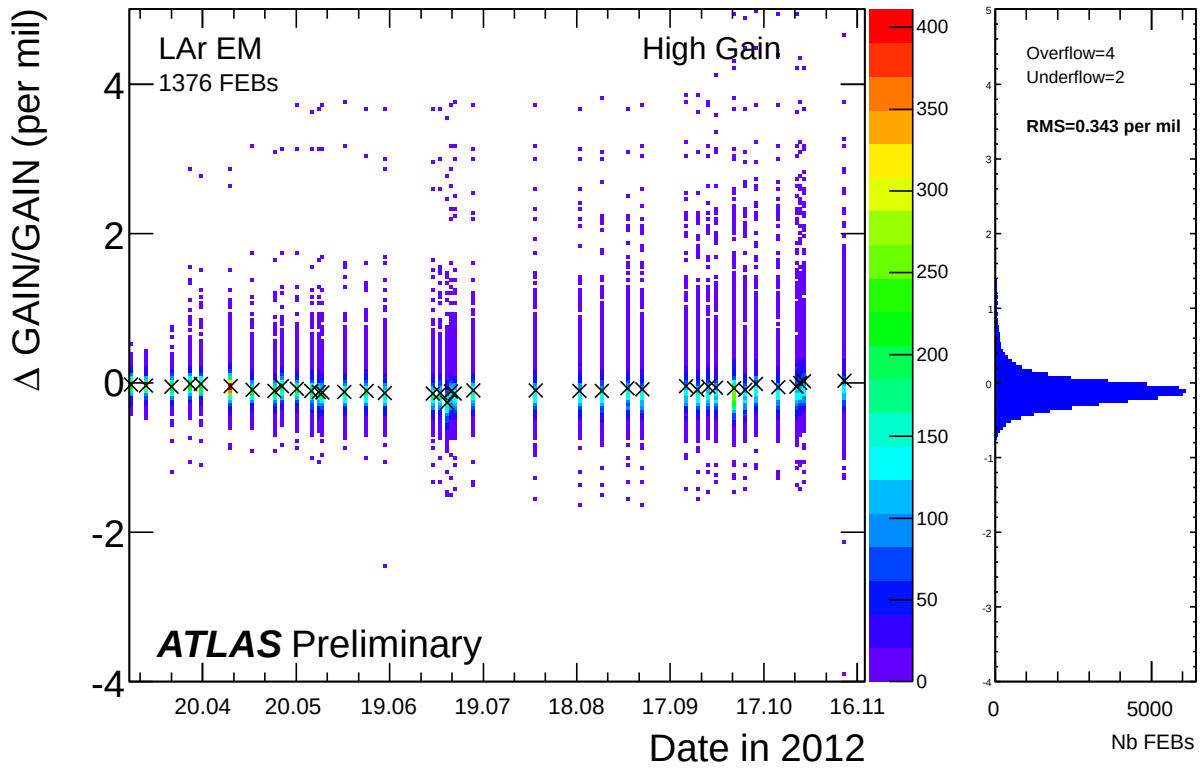

Figure 17: High gain EM gain stability.

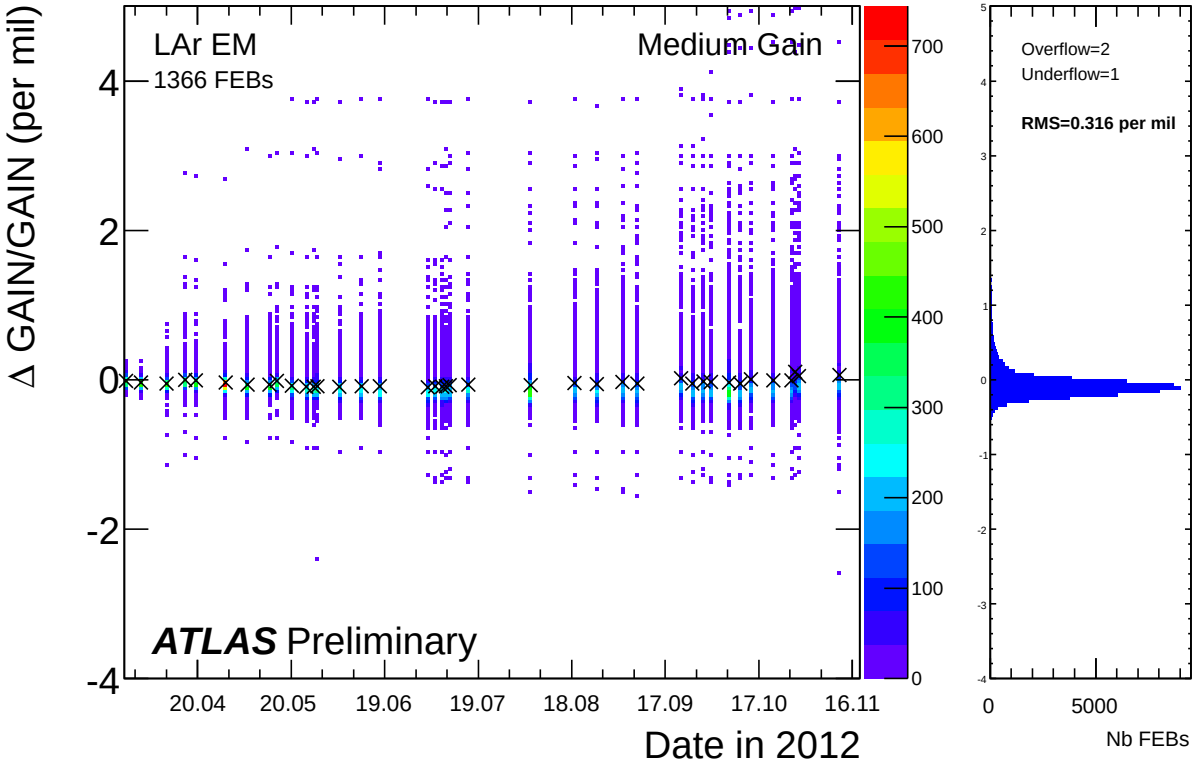

Figure 18: Medium gain EM gain stability.

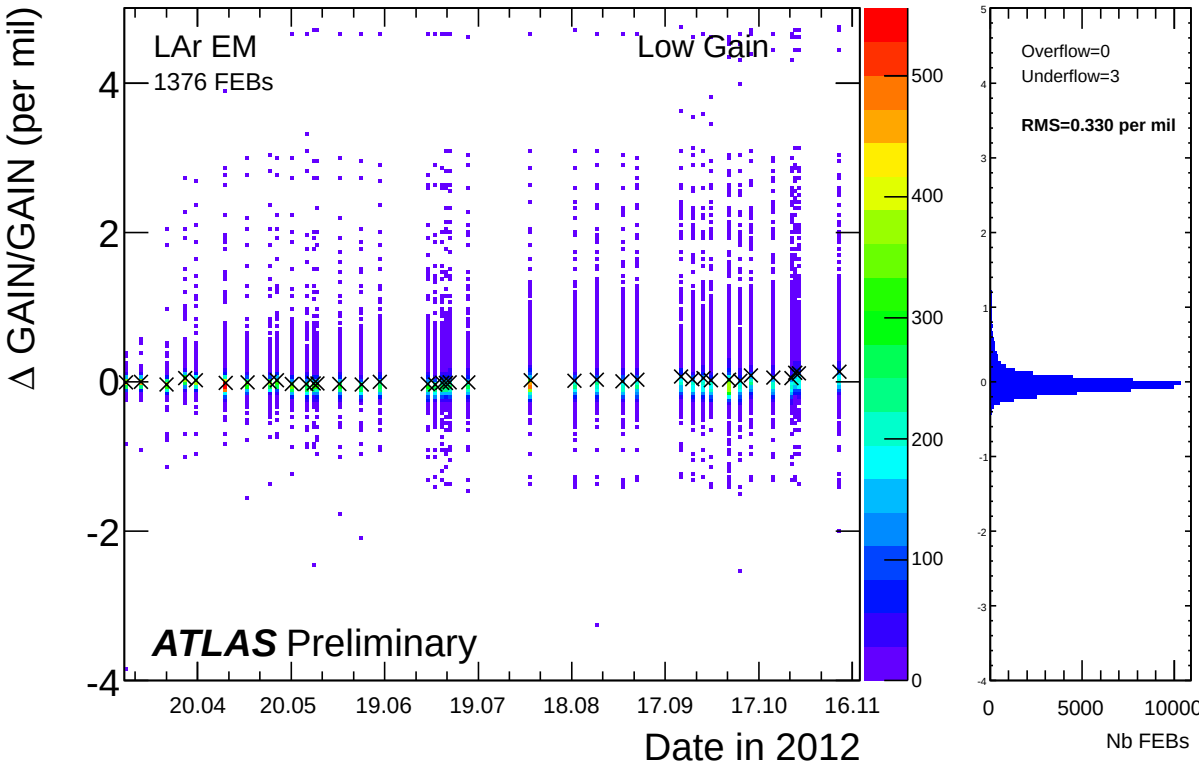

Figure 19: Low gain EM gain stability.

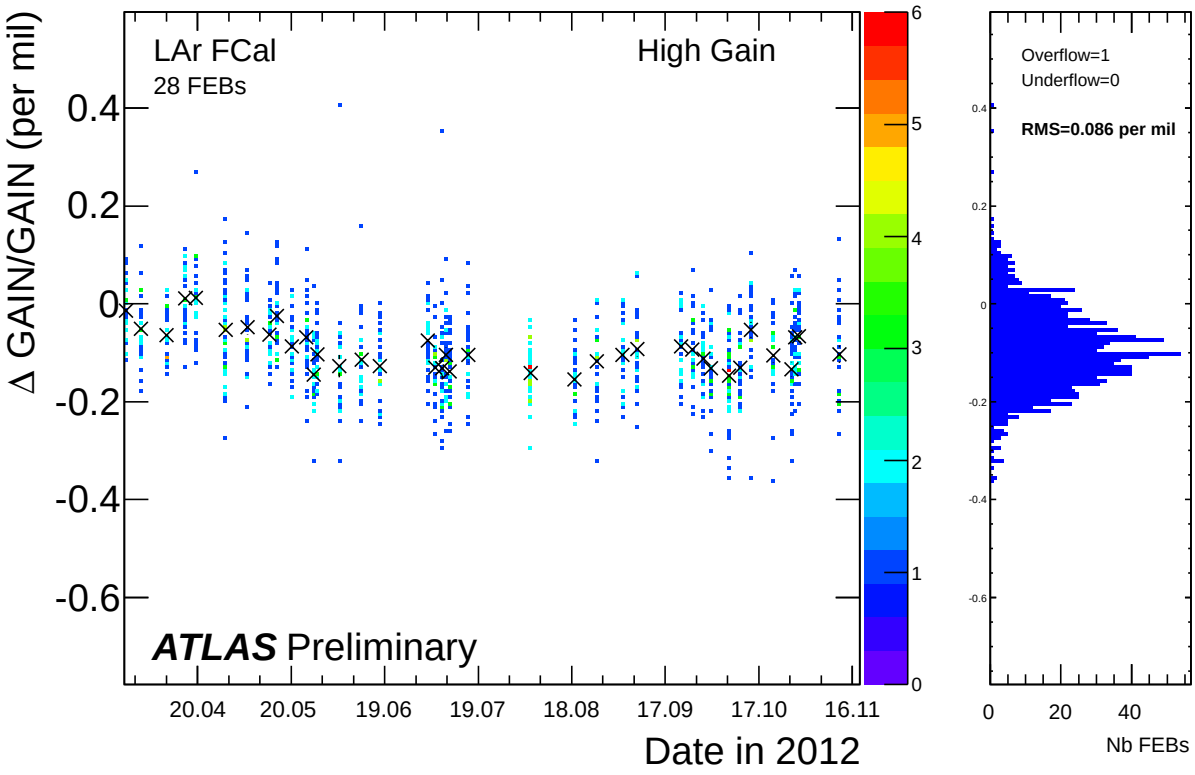

Figure 20: High gain FCAL gain stability.

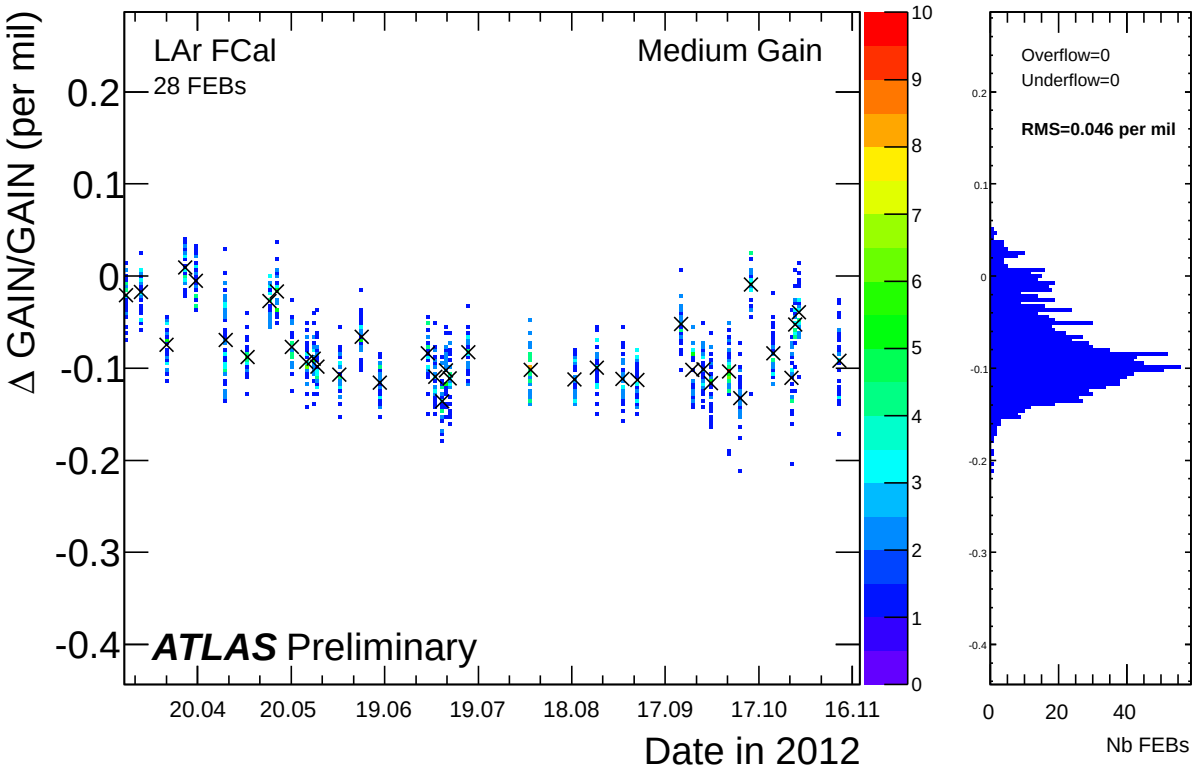

Figure 21: Medium gain FCAL gain stability.

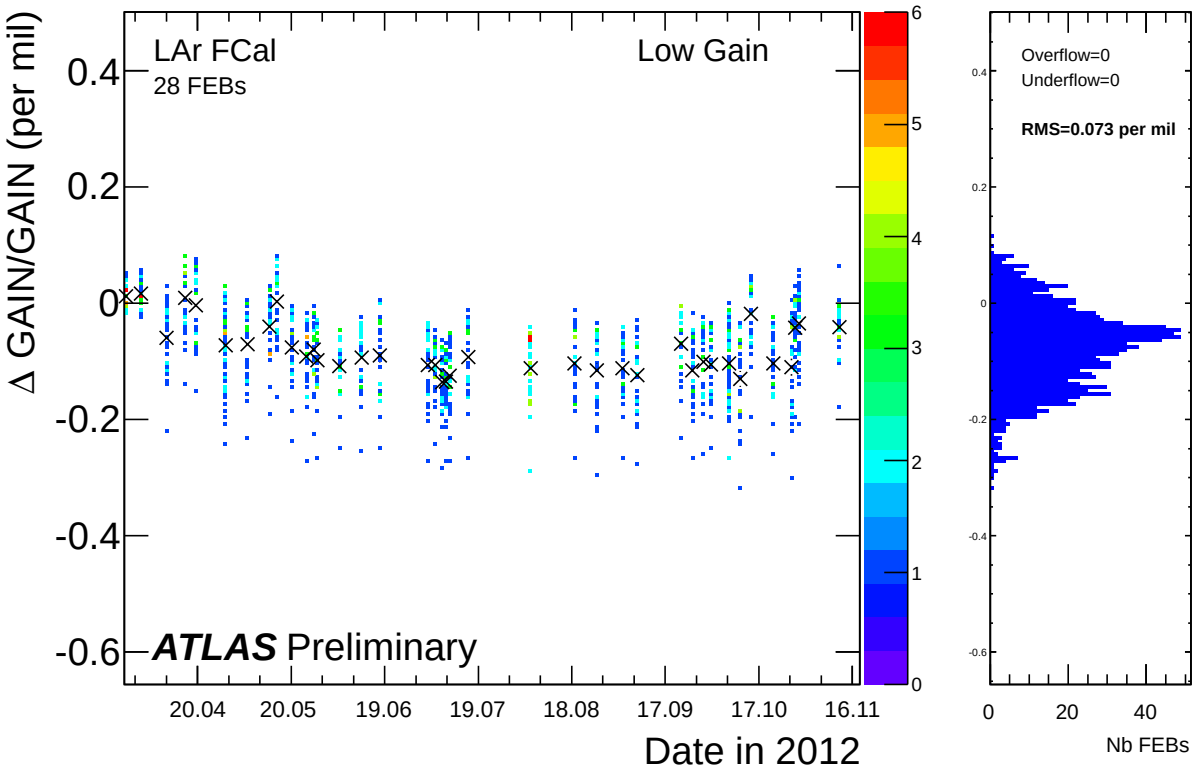

Figure 22: Low gain FCAL gain stability.

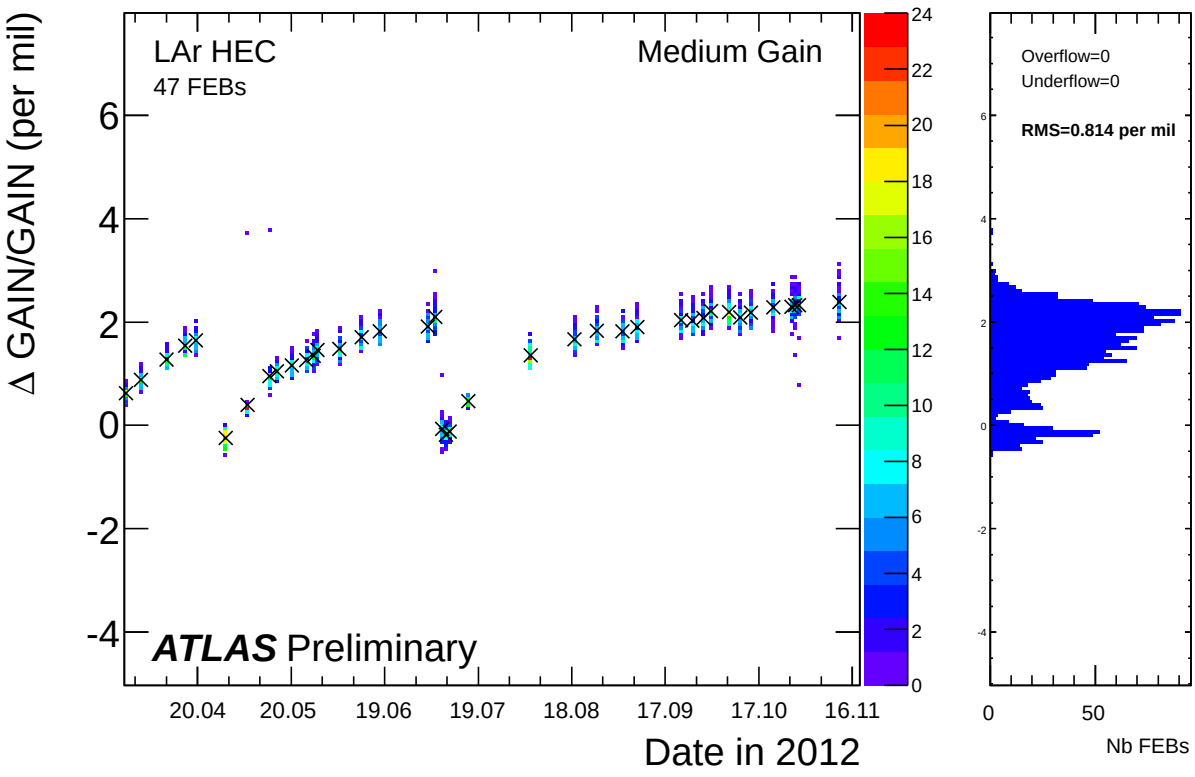

Figure 23: Medium gain HEC gain stability. Two jumps in the gain corresponds to a switching off/on the cold preamplifiers on HEC.

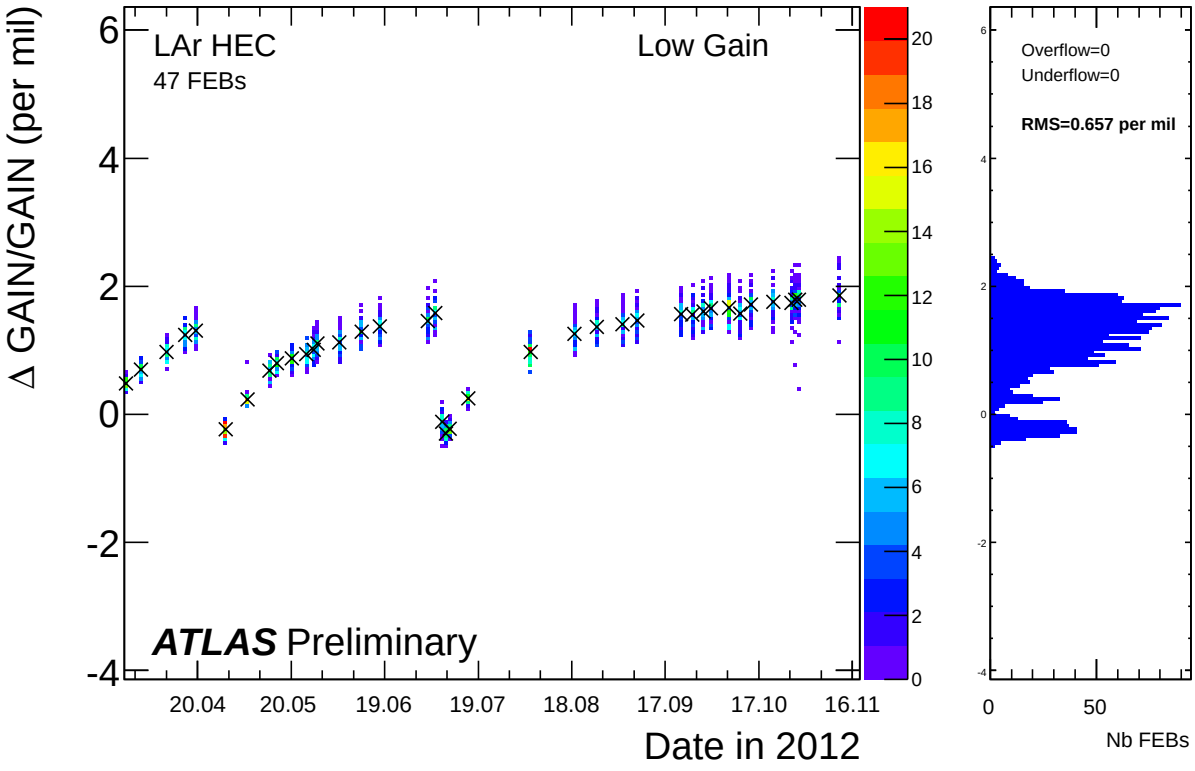

Figure 24: Low gain HEC gain stability. Two jumps in the gain corresponds to a switching off/on the cold preamplifiers on HEC.

5 Observations

The presented plots demonstrate that the pedestal, noise and gain of LAr electronics system are quite stable during the 2012 run.

The only notable exception is the HEC gain, which shows a jump and period of very long stabilization after switching off/on the cold preamplifiers. The effect is believed to be due to long thermal stabilization of powered chips inside the LAr bath.