Update on Source Calibration

Outline:
- Problem noticed in run 340
- Test of origin of problem
- Latest run: run 344 (see link on calibration page)
In the differences between run 340 and 339 there were large gain shifts, roughly correlated with the hardware.

Surprising, as the two calibrations were taken only five days apart.

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The gain shifts are correlated with shifts in the DAQ pedestal.

This should not be possible, as the source calibration determines its own pedestal. The DAQ pedestals are only used in creating the LUT for the source calibration.
Possible Explanation

- The DAQ pedestals do enter at second order because:
  - The FEX and trigger thresholds are determined using the DAQ pedestals. This can change the background distribution. For example, an upward shift in the DAQ pedestals by one ADC count will remove one bin from the histogram. Also, the peak position within the bin will change, in general.
  - This may cause fitting biases.
- To test the hypothesis that the shifts are somehow caused by a pedestal shift we did two source calibrations in quick succession, with a pedestal calibration in between.
- If the DAQ pedestals are irrelevant to the source calibration, we will see no gain shift.
- Because we were running out of time before the return of beams, we took two 15 minute calibrations. The previous run was a 30 minute calibration.
Gain shifts seen between two test runs! The DAQ pedestal does affect the results of the source calibration.
Even more surprising

- The gain differences between the first test run and the previous run are even more surprising.
- The two runs were taken two days apart. The only difference between the runs is their length (30 minutes for the first, 15 minutes for the second).
Gain shifts between run 342 and run 340

- Very large gain shifts seen between the two runs!
- The mean gain shift is very close to zero, suggesting that the gain shifts are not real.
- The RMS of the distribution is about 0.01.

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Conclusion

- The source calibration constants are not nearly as good as their statistical error suggests.
- The RMS gain shifts between runs 340 and 342 shows us that the source constants are valid to only about one percent.