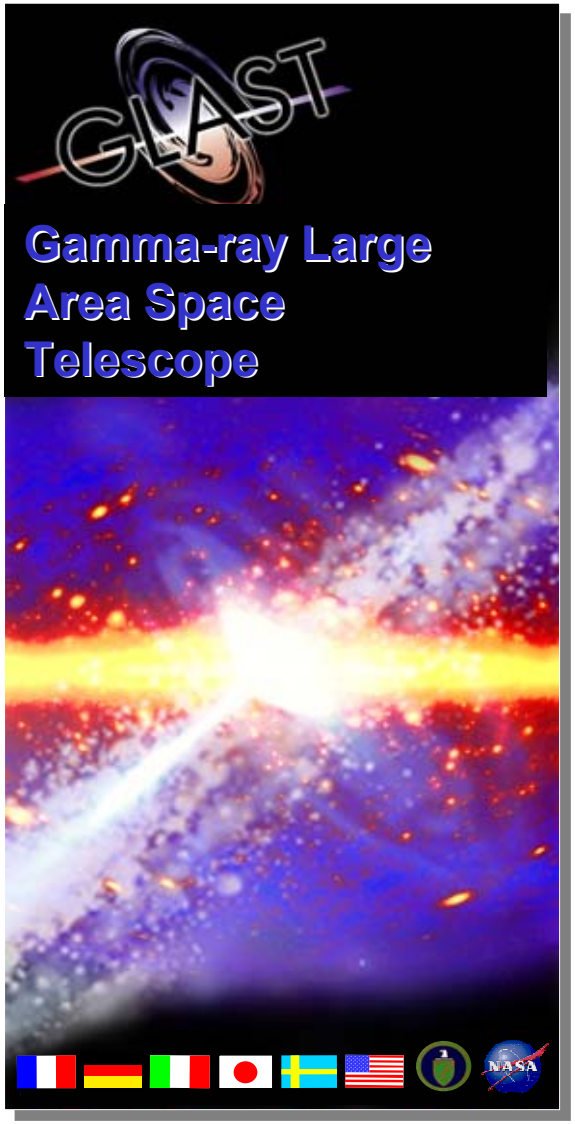

Charge injection DAC nonlinearity correction.

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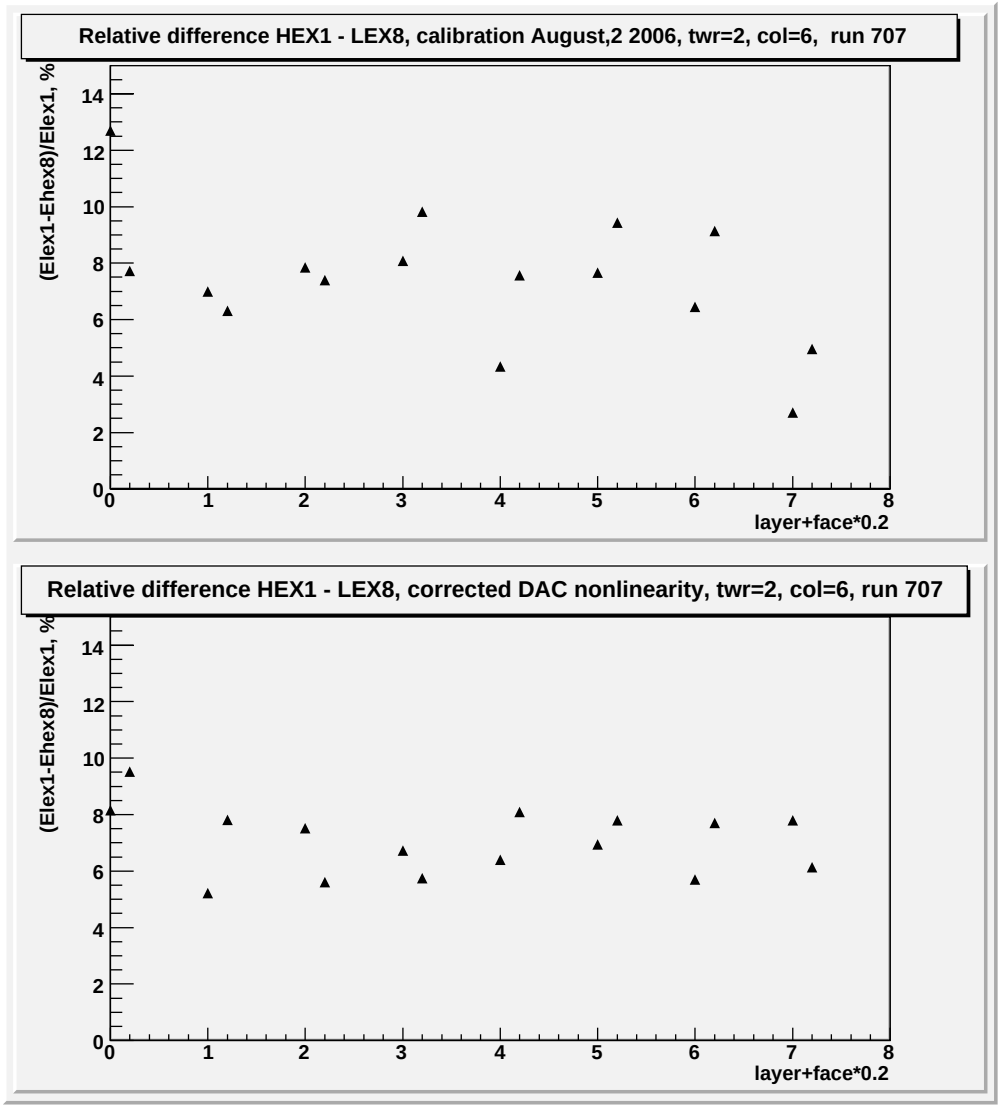
The changes to CAL calibration procedure

- Use the charge injection files collected with FLE/FHE=127 rather than with FLE/FHE = nominal, to avoid FLE/FHE crosstalk problems
  - Runs 446 (LE only, FLE=nominal) replaced by 450 (LE only, FLE=127)
  - Runs 447 (HE only, FHE=nominal) replaced by 451 (HE only, FLE=127)
- We suppose that charge injection DAC is not linear below DAC=64, while the ADC is linear in this region
  - so we fit linear function to the ADC vs DAC nonlinearity measurement in the region 64<DAC<192 and replace measured DAC values below 192 by the values calculated from ADC values using this linear function
  - The extrapolated DAC value at ADC=pedestal we call "DAC pedestal" and subtract it from all DAC values

Intercalibration of LEX1 and HEX8 ranges after reprocessing of run 707 with new calibration files



- Relative difference in energy scale between LEX1 and HEX8 ranges in %
  - Top plot: using old calibration
  - Bottom plot: using new calibration
- There is some improvement:
  - the fluctuations from layer to layer became smaller
- The main problem is still not solved:
  - All channels have in average ~7 % smaller energy in HEX8 range than in LEX1

What to do ?

- Energy measured by LEX1 and HEX8 are different and we don't know which one is correct
  - If the nonlinearity measurement in LEX1 is wrong while the intercalibration of LEX8 vs HEX8 with muons is correct, we should decrease LEX1 by the correction factor rather than increase HEX8
  - In the opposite situation we do the right thing
- Probably we have to try the proposal of Philippe Bruel to apply the correction factor to LEX1 and see if the results will become more reasonable
  - To do the correction properly in this case we have to apply a factor changing with energy, otherwise we'll change the low energies
  - If we don't care about low energy right now - we can try to correct LEX1 with a constant factor
- Some possibility to define which energy measurement is correct – to look at the position measurement based on LEX1 and on HEX8 and compare them with extrapolation from tracker:
  - As we have 2-3% different correction factors for opposite ends of the same crystal, this should lead to the position bias of ~1 cm, this is big enough to notice.