

Time evolution of HE to LE ratio calibration.

(Presented 23 Apr 2012 at C&A)

I tried to search for the reason of unexpected variation of CAL response vs energy noticed by Carmelo while he compared p7 reprocessed data with existing data:

[Quick look at CREs with Pass7 full reprocessing.](#)

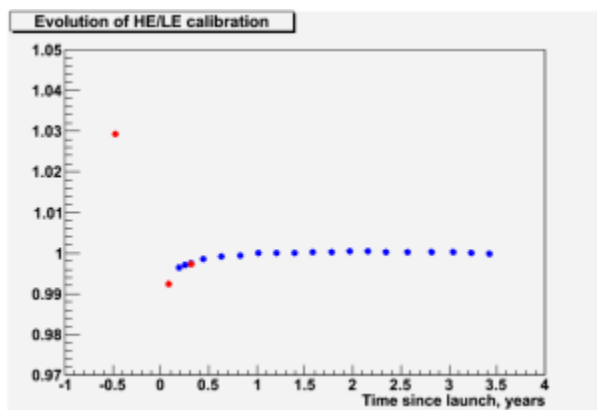
In CAL calibration folder \$LATCalibRoot/CAL/LAT-flight_gain we have 3 MeVPerDAC calibration files:

- \$LATCalibRoot/CAL/LAT-flight_gain/pre_launch_calib_0608/digitization-licos-v3r9p3_077014313_digi_DIGI.FLIGHT_GAIN.muonOptical.calMPD.xdiodeXtalk.xml
 - based on cosmic muon data collected during LAT TVAC test
 - used to process data June - November 13, 2008
- \$LATCalibRoot/CAL/LAT-flight_gain/On-Orbit/fit_protonCalib_calibOps_17runs.calMPD.xml
 - based on data collected Jul15, 2008
 - was not used for data processing
- \$LATCalibRoot/CAL/LAT-flight_gain/On-Orbit/fit_protonCalib_nomoSciOps_week26sep3oct2008_sum_try2.calMPD.xml
 - based on data collected Sep 26 - Oct 3, 2008
 - used to process all data since November 13, 2008

For pass7 reprocessing we used 17 new MPD calibration files each based on 6 Ms of data and used to reprocess data for the same period. For verification purposes I split first 6 Ms period into 3 periods 2 Ms each and generated separate calibration files for them.

Following plot shows the evolution of average ratio of calibration coefficients for HE and LE diodes with time for old calibration files (red points) and new calibration files (blue points).

All values on the plot are divided by 53.15 (actual mean ratio of MeVPerDAC coefficients of HE and LE diodes).



This plot confirms that the use of ground calibration file with higher HE/LE ratio until November 13, 2008 should introduce 3 % increase of energy response at high energies. This is consistent with effect found by Carmelo, because his plots show the ratio of energy obtained with NEW (correct) calibration to the energy obtained with OLD calibration (which is 3 % higher), so the result should demonstrate 3 % drop above few GeV.