

# The Calorimeter Quick-look Operational Manual

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(Flight Software v. 1.04)

## *Introduction*

The aim of this document is to describe the output of the calorimeter quick-look software.

The calorimeter quick-look output is made of 20 figures. Figures C1 and C20 are the “basic” figures that must be checked by operators, other figures are “expert” figures from which it is possible to better understand the calorimeter behaviour.

In case no problems are detected by the quick-look software on figures C1 and C20 the stamp “OK” is drawn, viceversa in case of any problem the stamp “WARNING” is drawn, indicating that it is necessary to call the specialist and look at “expert” figures. In case the “warning” message is issued the “expert” figure(s) which determined the warning is(are) highlighted in red colour.

In this document each output figure is described, constraints to the distribution are shown and a brief description on how to recognize possible problems is reported.

## *Description of “basic” figures:*

### **FIGURE C1:**

Description: Calorimeter status, checking for errors coming from the DSP and errors occurred during the unpacking of data.

NOMINAL: No "red" errors. The number of events must be the same for the four different sections and the preamplifiers can be fully transmitted only in COMPRESS or FULL mode. In that case the number of preamplifier transmission should not exceed half of the total number of COMPRESS and FULL mode events on each section.

STANDARD situations: - "CRC errors on data" on all the four sections of the order of some percent of data; - "Missing section" errors of the order of some percent of data; - "Latchup alarm" of the order of some percent of data. **NO ACTIONS** to be taken.

NONS TANDARD situations: - only one calorimeter section gives a lot of CRC errors; - high number of "Missing section" or "CRC errors on data"; - latchup alarm always on the same plane on most of the events; - one (or more) section always missing or pad empty, no response from one or more sections; - any other "red" error.

**ACTION:** call specialist.

### **FIGURE C20:**

Description: Calorimeter calibration status, checking for errors coming from the DSP and errors occurred during the calibration procedure.

NOMINAL: No "red" errors. The number of calibrations must be the same for the four different sections.

NONS TANDARD situations: - different number of calibrations for different sections. - any "red" error. **ACTION:** call specialist.

*Description of “expert” figures:*

**FIGURE C2:**

Description: DSP counter versus unpacker counter.

NOMINAL: Linear dependence.

STANDARD situations: - flat line, in case of a partial RAW data acquisition this is nominal; - "no dsp infos", in case of RAW data acquisition this is nominal; - more segments not passing through zero is normal behaviour for different runs. NO ACTIONS to be taken.

NONS TANDARD situations: - non linear dependence; - big gaps in the linear plots. ACTION: call specialist.

**FIGURES C3, C4, C5:**

Description: Difference between the four calorimeter DSP counters.

NOMINAL: Figures C3, C4 and C5 are NOT shown.

STANDARD situations: - in case of errors in figure C1 this three figures will be shown. NO ACTIONS to be taken.

NONS TANDARD situations: - no errors in figure C1 and figures C3, C4 and C5 shown. ACTION: call specialist.

**FIGURE C6:**

Description: In full mode difference between RAW and COMPRESS data.

NOMINAL: The figure C6 should NEVER be shown.

NONS TANDARD situations: - The figure is shown. ACTION: call specialist.

**FIGURE C7:**

Description: Number of strip hit as calculated by the quicklook software using compressed data. Two peaks are expected: the noise peak at about 15 hit and the non-interacting particle peak at about 60 hit.

NOMINAL: The two peaks are inside the yellow areas.

STANDARD situations: - during calorimeter warming up the two peaks could be translated to slightly higher values. - no figure and C8 figure is present (no DSP mode data available); NO ACTIONS to be taken.

NONS TANDARD situations: - more than two peaks; - peaks outside yellow areas even after long time from PAMELA switching on; figures C7 and C8 are both missing; - only data at zero hit. ACTION: call specialist.

**FIGURE C8:**

Description: Number of strip hit as calculated by the quicklook software (strip with signal greater than zero) using raw data. One peak is expected centered to the number of working strips.

NOMINAL: The peak coincide with the yellow line (at 4223 hit).

STANDARD situations: - no figure and C8 figure is present (no RAW mode data available); - more than one peak and errors in figure C1; NO ACTIONS to be taken.

NONS TANDARD situations: - more than one peak and no errors in figure C1; - figures C7 and C8 are both missing; - only data at zero hit. ACTION: call specialist.

### **FIGURE C9:**

Description: In full or compress mode the distribution of the common noise of preamplifiers as calculated by the DSP (baselines) is shown.

NOMINAL: Most of the data should be inside the yellow region.

STANDARD situations: - The distribution spreads over a larger range of ADC values. The file contains calibrations too distant in time or the calorimeter has just been switched on. - Signal at about 32000 ADC channels. Latchup in one or more viwes.

ACTION: check after a calibration, if problem persist contact specialist.

NONS TANDARD situations: - Only data at zero or at about 32000. All data suffered CRC errors? Are the calorimeter planes switched on? is the calorimeter HV working? are data arriving from the other detectors? ACTION: call specialist.

### **FIGURE C10:**

Description: In full or compress mode the energy distribution in ADC channels is shown. If there are no compress or full data this pad will remain empty.

NOMINAL: Most of the data should be inside the yellow regions.

STANDARD situations: - The distribution spreads over a large range of ADC values. The file contains calibrations too distant in time or the calorimeter has just been switched on. Check again in the following files. - Small peak at about 32000. A not working strip sometimes can give that value, not a problem till the number of entries of the peak is smaller or equal to the number of collected events in DSP mode. NO ACTION to be taken.

NONS TANDARD situations: - Only data at zero or at about 32000. All data suffered CRC errors? Are the calorimeter planes switched on? is the calorimeter HV working? are data arriving from the other detectors? ACTION: call specialist.

### **FIGURE C11:**

Description: Number of strip hit as calculated online by the DSP. Two peaks are expected: the noise peak at about 15 hit and the non-interacting particle peak at aout 60 hit. The pad is empty if only raw data are aquired.

NOMINAL: The two peaks should be inside the yellow areas.

STANDARD situations: - More than two peaks or peaks at higer values than 70 or peaks not centered where expected. ACTION: Check data after a calibration.

NONS TANDARD situations: - Only data at zero hit. All data suffered CRC errors? Are the calorimeter planes switched on? is the calorimeter HV working? ACTION: call specialist.

### **FIGURE C12:**

Description: In raw mode the energy distribution in ADC channels is shown. If there are no raw data this pad will remain empty.

NOMINAL: Most of the data should be inside the yellow regions.

STANDARD situations: - Peak at zero or at about 32000 ADC channels. CRC errors? Missing sections? Latchup alarms? ACTION: Check in figure C1, check again after a calibration.

NONS TANDARD situations: - Only data at zero or at about 32000. All data suffered CRC errors? Are the calorimeter planes switched on? is the calorimeter HV working?

are data arriving from the other detectors? ACTION: call specialist.

#### **FIGURE C13:**

Description: The RMS of calorimeter strips obtained during a calibration procedure (color view).

NOMINAL: This figure is NOT shown by default. There should be no white planes (latchup) and no white strips (dead strips). The number of "bad" strips can vary and could be a maximum of about 25/30 in each panel (50/60 in total). Usually the two panels must be bluish, some green strips (about 15/20 in each panel), some red strips (about 5/10 in each panel), some black strips (about 5/10 in each panel). No violet strips should be seen.

STANDARD situations: - one (or more) white plane(s); latchup alarms? - a black and white plane; latchup alarm from a plane during calibration? - a lot of white or red strips; problems during calibration? ACTION: check a following calibration if problem persist contact specialist.

NONS TANDARD situations: - one panel has eleven planes white interleaved with normally coloured panels. One section is missing. - all white. ACTION: call specialist.

#### **FIGURE C14:**

Description: The pedestals of calorimeter strips (ADC channels) obtained during a calibration procedure.

NOMINAL: Most of values inside yellow region.

STANDARD situations: - some hits outside yellow region; - about hundred consecutive values at zero; latchup alarm from a plane during calibration? ACTION: check a following calibration if problem persist contact specialist.

NONS TANDARD situations: - eleven set of hundred planes at zero. One section is missing. - all zero. ACTION: call specialist.

#### **FIGURE C15:**

Description: The RMS of calorimeter strips (ADC channels) obtained during a calibration procedure.

NOMINAL: Most of values inside yellow region.

STANDARD situations: - some hits outside yellow region; - about hundred consecutive values at zero; latchup alarm from a plane during calibration? ACTION: check a following calibration if problem persist contact specialist.

NONS TANDARD situations: - eleven set of hundred planes at zero. One section is missing. - all zero. ACTION: call specialist.

#### **FIGURE C16:**

Description: Bad strips during a calibration procedure (not used in baseline calculation).

NOMINAL: No more than 50 hits.

NONS TANDARD situations: - all black. - no hits. ACTION: call specialist.

#### **FIGURE C17:**

Description: The thresholds (ADC channels) used during a calibration procedure.

NOMINAL: Most of values inside yellow region.

STANDARD situations: - some hits outside yellow region; - about six consecutive values at zero or 255; latchup alarm from a plane during calibration? - about six consecutive values at higher values; noise on one plane during calibration? ACTION: check a following calibration if problem persist contact specialist.

NONS TANDARD situations: - eleven set of hundred planes at zero or 255. One section is missing. - all zero. ACTION: call specialist.

#### **FIGURE C18:**

Description: Strip variance (ADC channels) during a calibration procedure.

NOMINAL: Most of values inside yellow region.

STANDARD situations: - some hits outside yellow region; - about six consecutive values at zero or 255; latchup a larm from a plane during calibration? - about six consecutive values at higher values; noise on one plane during calibration? ACTION: check a following calibration if problem persist contact specialist.

NONS TANDARD situations: - eleven set of hundred planes at zero or 255. One section is missing. - all zero. ACTION: call specialist.

#### **FIGURE C19:**

Description: Baselines (ADC channels) obtained during a calibration procedure.

NOMINAL: Most of values inside yellow region.

STANDARD situations: - some hits outside yellow region; - about six consecutive values at zero or 32000; latchup alarm from a plane during calibration? - about six consecutive values at higher values; noise on one plane during calibration? ACTION: check a following calibration if problem persist contact specialist.

NONS TANDARD situations: - eleven set of hundred planes at zero or 32000. One section is missing. - all zero. ACTION: call specialist.