Pacs FM (ILT, IST, TVTB, CoP) Short Performance Test: 518 Test of internal calibration recipes in photometry

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Abstract

This test contains a measurement in photometry mode with chopping between CS1 and CS2 with various frequencies in both filters (always OBCP 4: "OBCP_chopped_photometry") which was executed on OD 27 (10-Jun-2009). There were no events produced during this test. The CRDCCP counter (NCR4497) was correctly incrementing during the OBCP executions. The SPU averaging of 4 signal readouts is now in synchronisation with respect to the chopper transitions. Signals are not averaged anymore over chopper transitions. Anomaly: The measurement is severely affected by a wrong photometry configuration during the preceeding PHOT orbit prologue and no bolometer signals are available for this test (only VRL reference signals).

Contents

1 Overview

Author	:	T. Müller, MPE
Test ID	:	518
		Test of internal calibration recipes in photometry
CUS	:	PHOT_cal_recipes_OBS
FM-CoP	:	1342178060 PacsEng_Phot_cal_recipes (OD 27)
FM-IST	:	FM_IST_data/20080827/FIST_SPT_Phot518_20080827.tm
FM-ILT	:	FM_ILT_data/20070411/FILT_IST_20070411_518_CalRecipes_50.tm
Times	:	2009-Jun-10, 2008-Aug-27, 2007-Apr-11
Documents	:	RD-1: HP-2-ASED-TP-0205, Issue 1
		RD-2: PACS-ME-TP-021

2 Content & Commanding History

2.1 Content of measurement

This test contains a measurement in photometry mode with chopping between CS1 and CS2 with various frequencies both filters (always OBCP 4: "OBCP_chopped_photometry"). The CUS-script "PHOT_cal_recipes_OBS" contains the following commanding sections:

- Start SPU with default reduction/compression mode

- move to filter A (green band)

- Perform 7 times OBCP 4 (DMC sequence 1) with different settings (only calibration loop is executed with chopping between CS1 at -21 350 and CS2 at +21 200):

Plateau length in [40 Hz readouts]	Plateau duration [sec]	Nr. of chopper cycles
600	15.000	4
160	4.000	15
80	2.000	30
40	1.000	60
20	0.500	120
10	0.250	240
5	0.125	240

- move to filter B (blue band)

- Perform 7 times OBCP 4 (DMC sequence 1) with different settings (only calibration loop is executed with chopping between CS1 and CS2):

Plateau length in [40 Hz readouts]	Plateau duration [sec]	Nr. of chopper cycles
600	15.000	4
160	4.000	15
80	2.000	30
40	1.000	60
20	0.500	120
10	0.250	240
5	0.125	240

- move to filter A (green band)

- Stop SPU

Fig. 1 shows the chopper pattern for the first part of the measurement (filter A).

2.2 Commanding history

Commanding history on OD 27:
OBSID 1342178058   PacsEng_BOLO_cooler   1005038   Cooler recycling
OBSID 1342178059   PacsEng_PHOT_orbit_prologue   1005039   nStdPHOTsetup_nominal
BOLObias_ILT_standard_low, 48.0, 58.0, 2100, direct mode, VRL, BOLObias_standard_high)
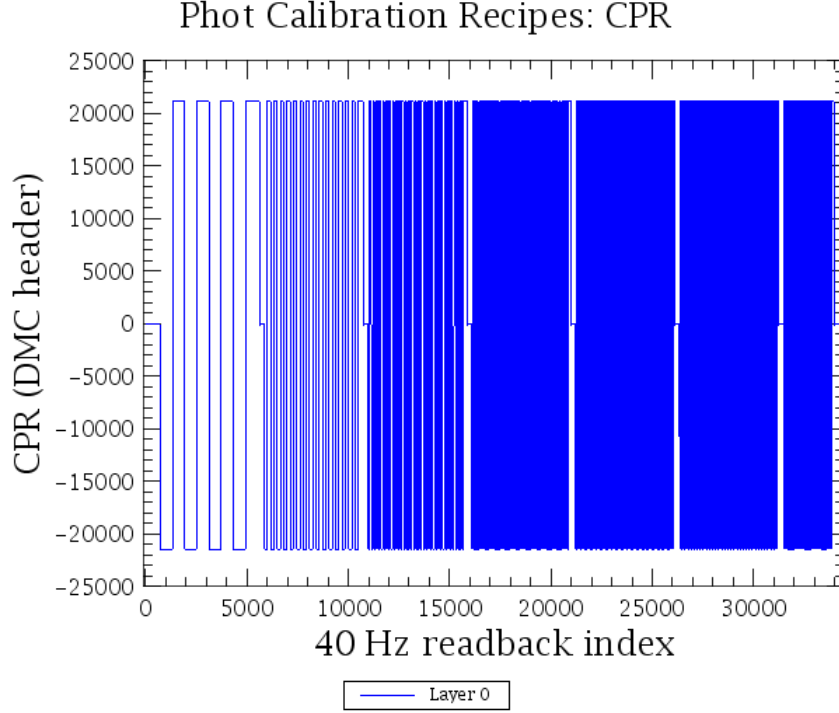OBSID 1342178060   PacsEng_Phot_cal_recipes   1005040   IST518_nStdCal_recipes

Figure 1: The chopper pattern during the first part of the test in filter A.

3 Data packet analysis

Packet Type	FM_ILT (MPE)	FM_IST (ESTEC)	CoP	Remarks
ESSENTIAL_HK	177	183	171	longer tm-recording in FM_IST
PHOT_HK	886	918	856	"
PHOT_SC_BLUE	26202	25097	14854	better compression in FM_IST
PHOT_SC_RED	6905	6788	3448	& wrong setting in CoP
TC_ACP_OK	53	53	60	
TC_EXE_COMPL	14	14	14	
TC_EXE_START	14	14	14	
EVENT_REPORT_5_28	0	1	0	(Unexpected 1355 ACK)
EVENT_REPORT_8_15	0	1	0	(Counter Error)
total readouts in DMC-sequences	62 400	63 397	62 400	

The total number or readouts within the 14 DMC-sequences is 62 400, but due to the abortion of the seventh DMC-sequence in FM_IST there seem to be more readouts during FM_IST, but that is only because the label was not correctly reset after the end of DMC-sequence number 7.

The bolometer status reflects correct settings for low gain in direct mode, but the BOL_CCKRLH/L and BOL_VDECXH/L are not correctly set and therefore no bolometer signals were produced (only some kind of reference signals from BOLC).

The packet analysis looks very clean (except the number of TC_ACP_OK which is not correctly reflecting the number of CUS commands):

- there are no event packets

- the science packets are produced

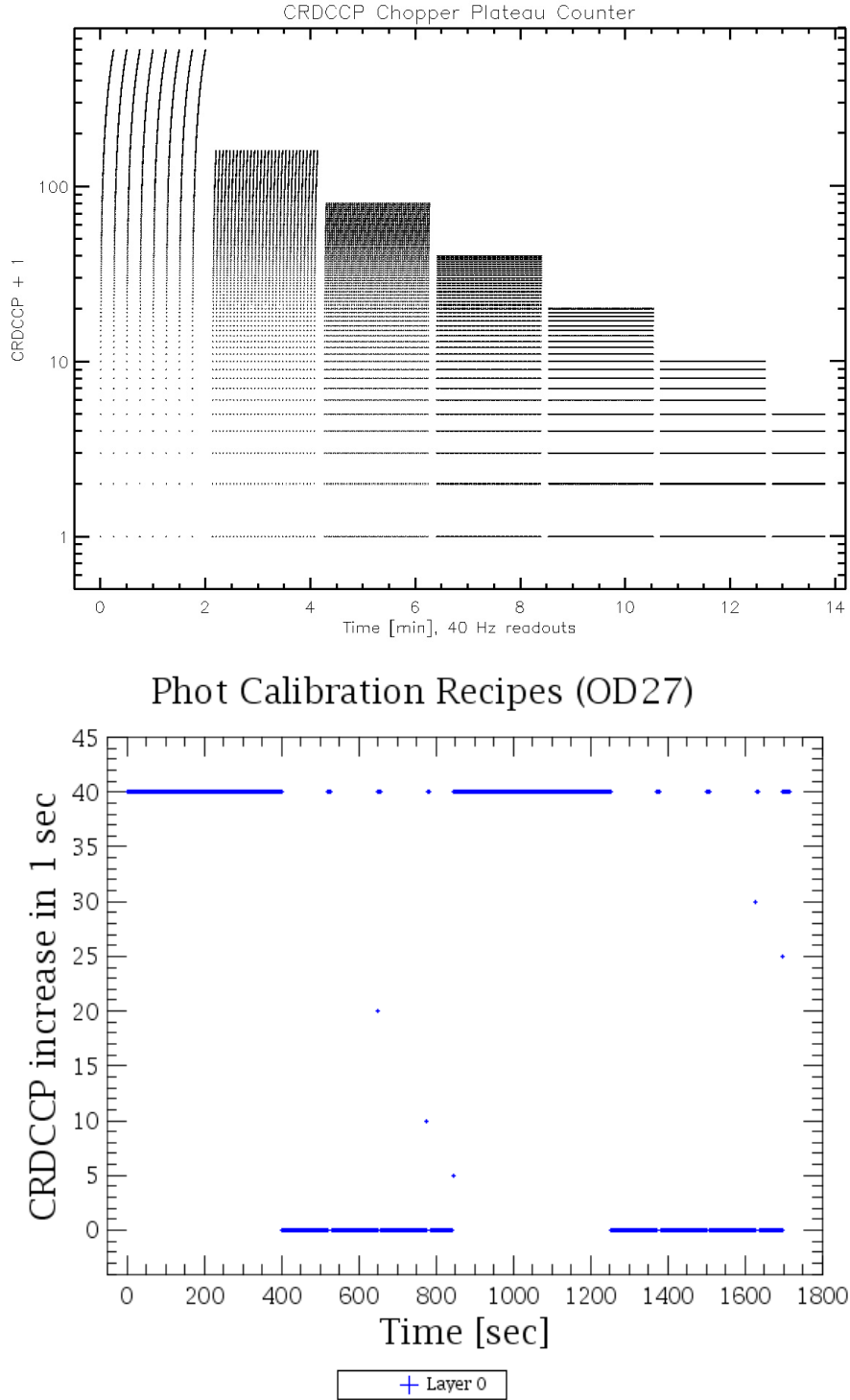- 14 OBCPs were running and correctly completed

4 Analyis of test content

Figure 2: Top: The CRDCCP chopper plateau counter for the first and the second 7 DMC sequences. The counter increases for each chopper plateau to the exact commanded number of readouts (600, 160, 80, 40, 20, 10, 5 readouts). Bottom: The CRDCCP increase during the OBCP executions. The counter is correctly increasing with 40 units per second (NCR 4497).
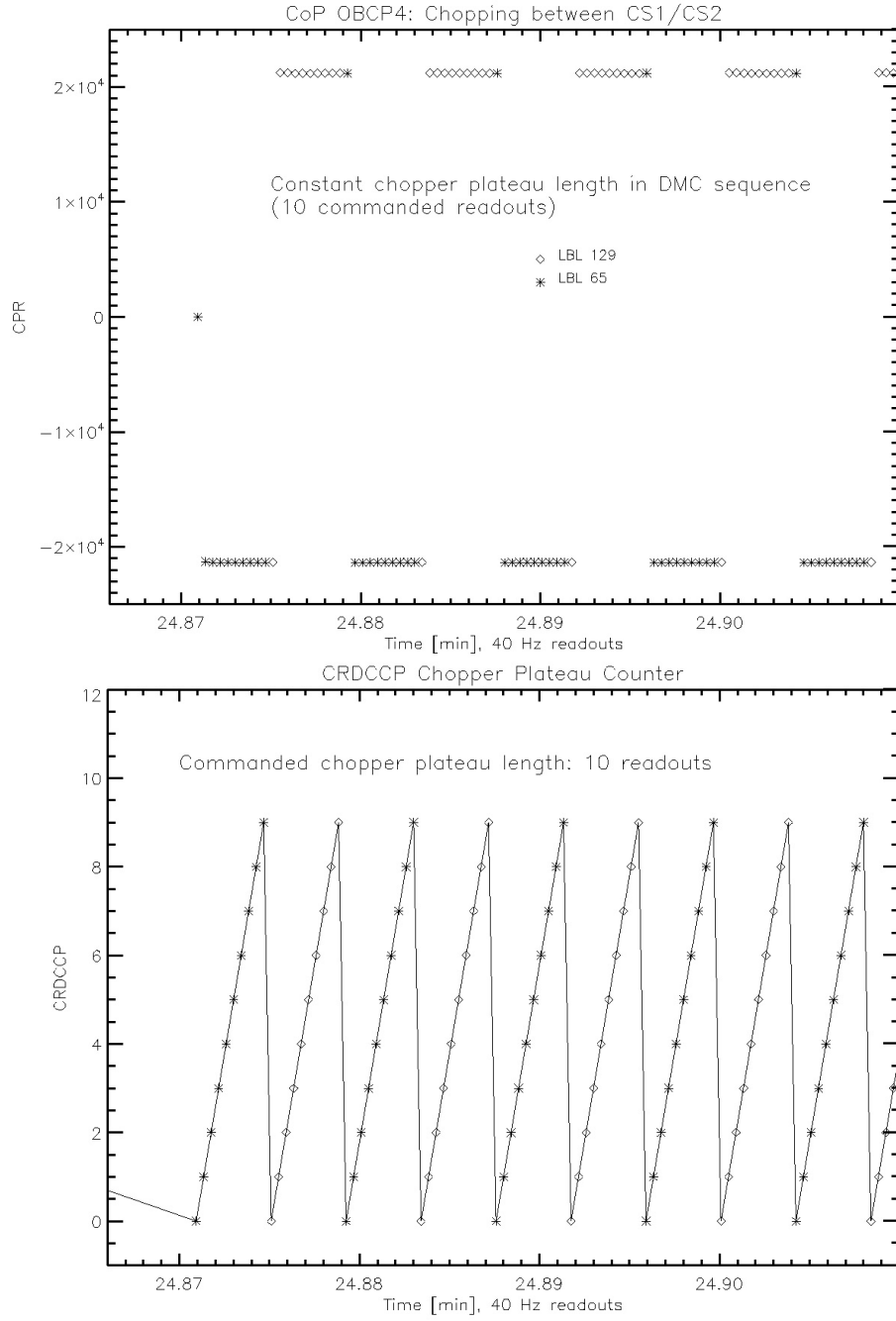
Figure 3: The CPR and CRDCCP for the 13th DMC sequences with 10 commanded readouts per chopper plateau. The chopper transition takes place exactly after the first readout with the new label. The CRDCCP increases by one for each readout on each chopper plateau from 0 to 9.
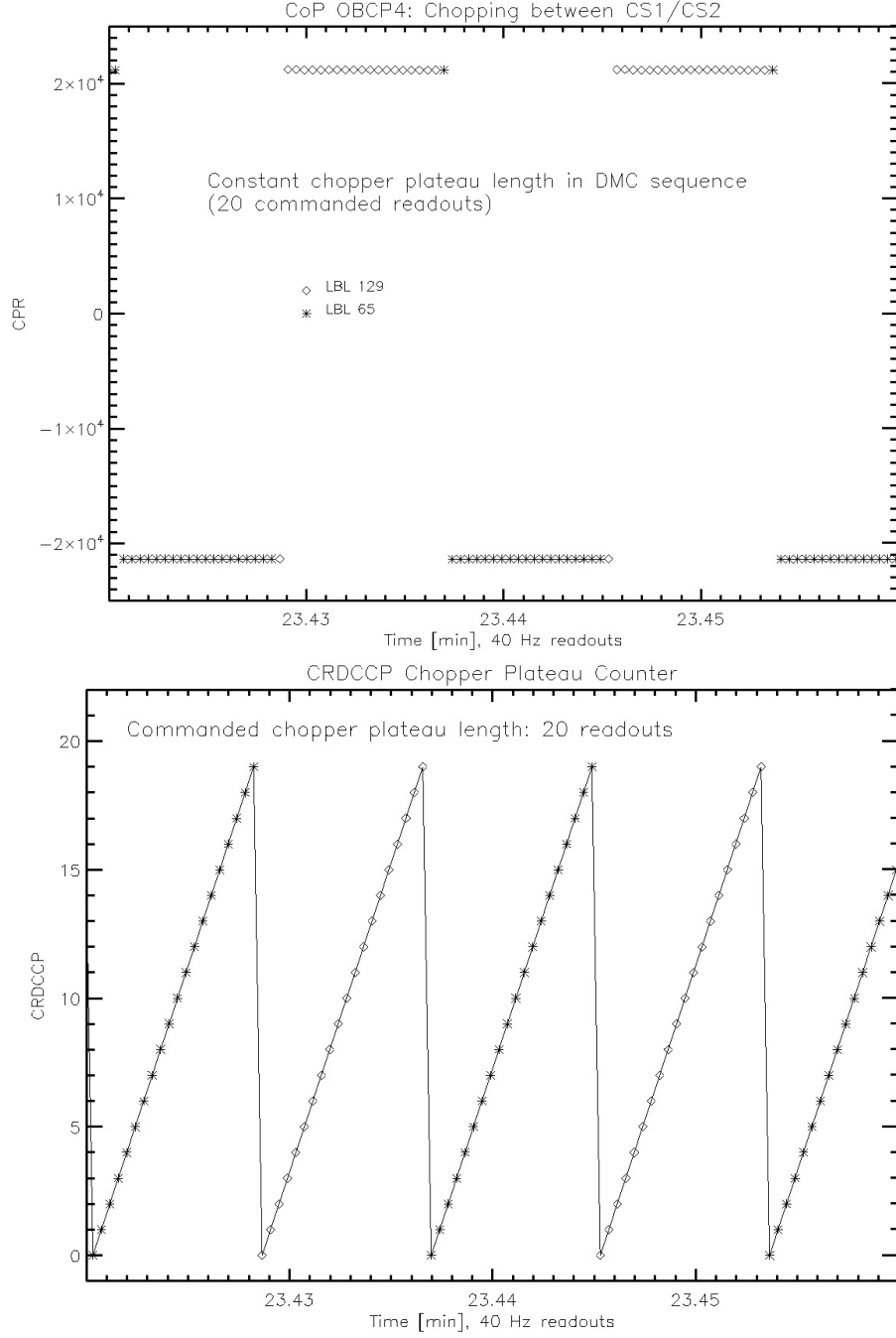
Figure 4: The CPR and CRDCCP for the 12th DMC sequences with 20 commanded readouts per chopper plateau. The chopper transition takes place exactly after the first readout with the new label. The CRDCCP increases by one for each readout on each chopper plateau from 0 to 19.
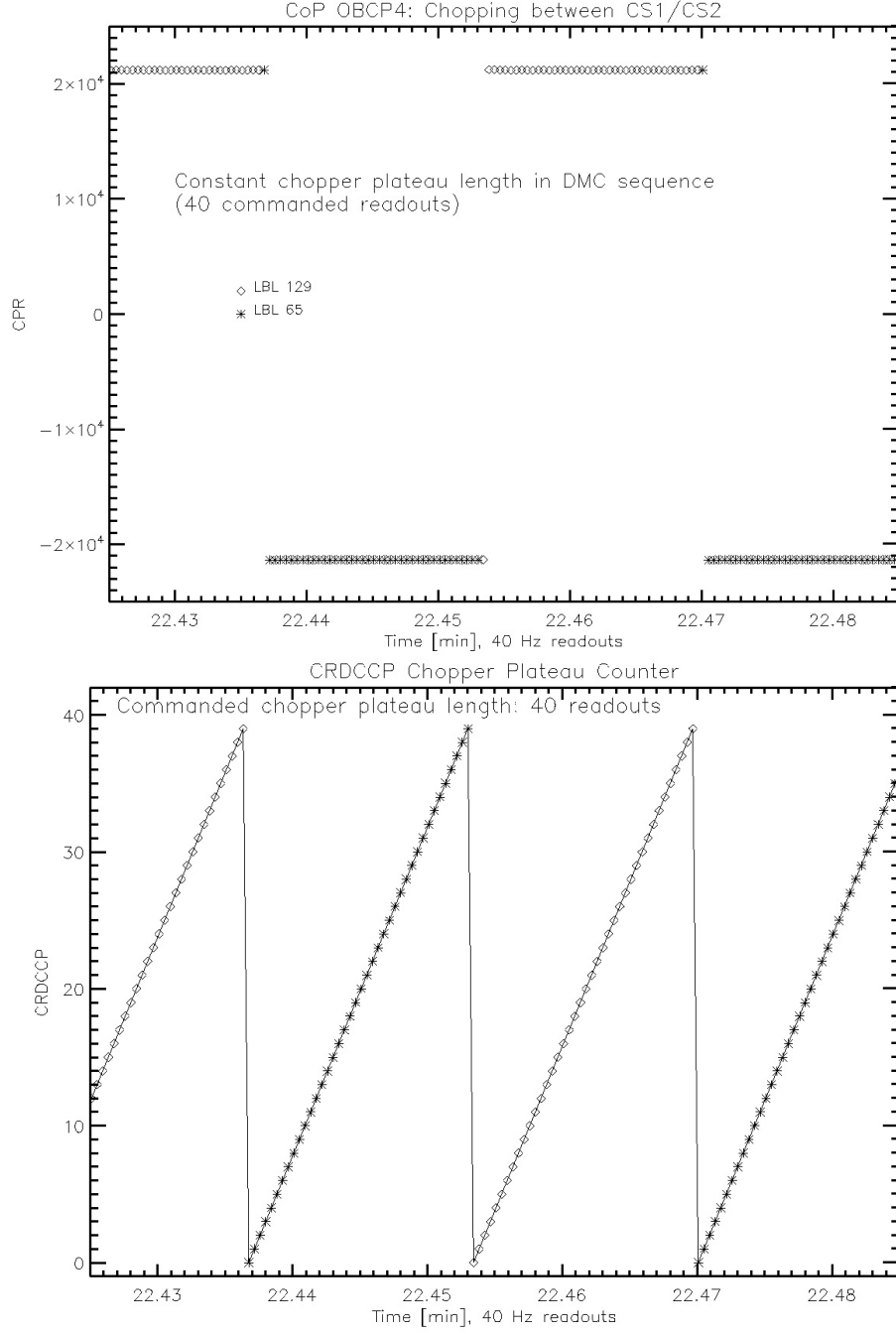
Figure 5: The CPR and CRDCCP for the 11th DMC sequences with 40 commanded readouts per chopper plateau. The chopper transition takes place exactly after the first readout with the new label. The CRDCCP increases by one for each readout on each chopper plateau from 0 to 39.
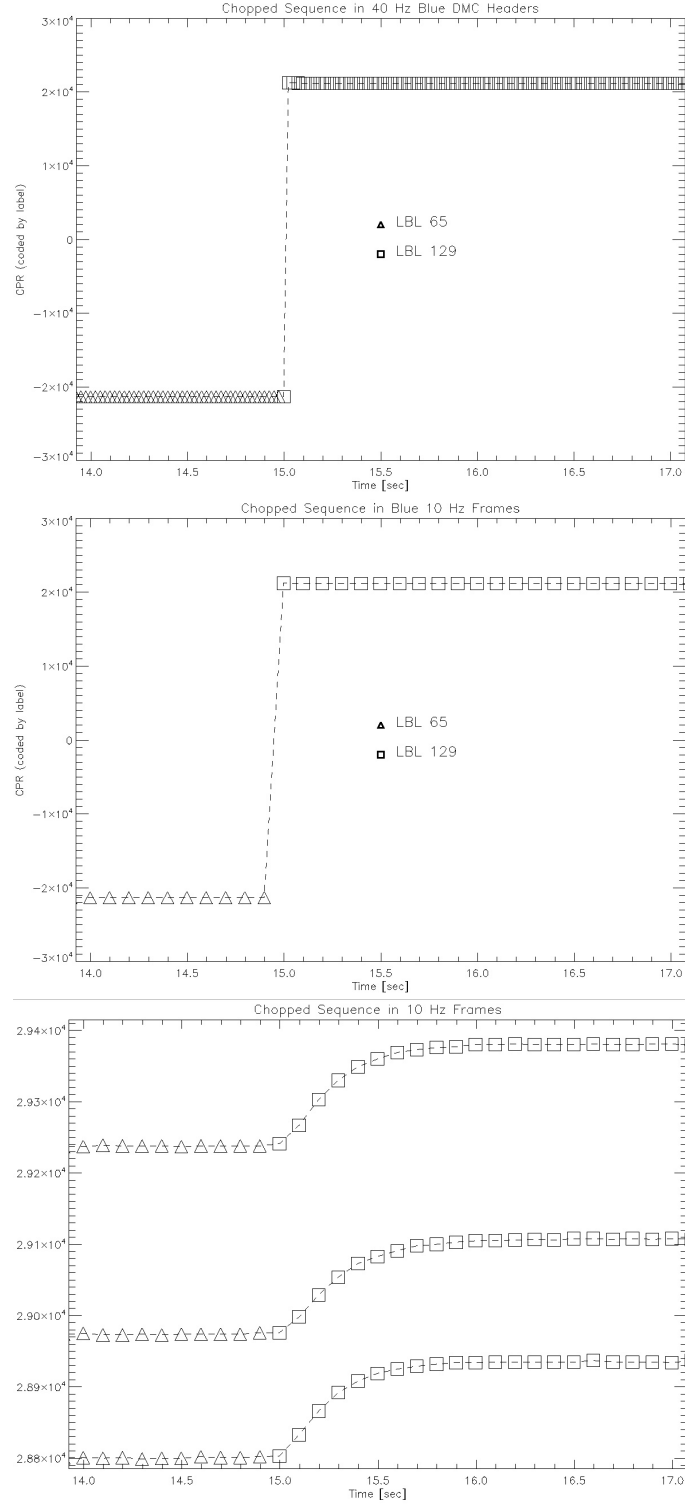
Figure 6: The CPR with 40 Hz time resolution as given in the DMC header entries (top), the CPR with 10 Hz as given on frames level (middle) and the signal (here only the VRL signal and **not** the bolometer signal) as given in the frames (bottom). The sequence shown is taken from the first OBCP execution. The CPR (top, middle) are plotted symbols coded by the corresponding label information. The chopper movement takes place right after the label change, but the SPU is correctly avaraging the CPR information (and also the signal information) **after** the chopper transition has taken place. This is related to the shift of 1 readout when starting the quadruple averaging after a DMC sequence has started. The corresponding SPU parameter "SDEL" is therefore correctly implemented in "CONF_PHOT_params" in the variables syncdel_red and syncdel_blue (for all configurations set to 1) and correctly applied onboard. The signals shown here (bottom) are only VRL signals and are not representative in any kind.