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Organisation Européenne pour des Recherches Astronomiques dans l'Hémisphère Austral
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VERY LARGE TELESCOPE

Prima Metrology 9th Technical Report **22/1 to 2/2/2011** **(as part of PRIMA COM14)**

Doc. No.: VLT-TRE-ESO-15730-5387

Issue 1

Date: 21/3/2011

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CHANGE RECORD

Issue	Date	Affected Paragraphs(s)	Reason/Initiation/Remarks
1	21/3/2011	all	First issue

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1 SCOPE

This documents summarises the results obtained during the PRIMET test period held at Paranal between 22/1 and 2/2/2011.

2 EXECUTIVE SUMMARY

- PRIMET functional testing has been fully completed in the period 22/1 to 2/2/2011
- PRIMET is now compatible with (and robust against) all PRIMA operational modes and "stimuli" of the astrometric template, thanks to the implementation of solutions to the problems identified during COM13:
 - o The DLs are not preset anymore during a swap
 - o Implementation of rate/acceleration limits for both the DLs and the [DDLs](#). The values determined during COM14 are:
 - [DDL](#): Rate=1000 microns/s ; Acceleration=8000 microns/s² (mechanical)
 - DL: Rate=0.005m/sec ; Acceleration 1.8 m/s² (mechanical)
 - o Implementation of a new dark/flat calibration scheme using IRIS and the [STS](#)-FSM
- Two initial problems had to be solved at the beginning of COM14:
 - o hardware error of one phasemeter: a spare phasemeter had to be cannibalized.
 - o hardware error of the wavemeter: a new mode of operation without laser frequency stabilization has been implemented
- Implementation and test of a PRIMET Health check template (Bob template on pacman released for operation: PACMAN_TEC_METHEALTH).
- PRIMET start-up/shut-down are integrated in the VLT/PRIMA start-up/shut-down of ISS
- Training initiated for the operation of PRIMET by Sciops
- Training of the VLT managers (start-up/Interlock): S.Poupar, P.Mardones, J.O'Neil

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Perspective for the next run:

- Review and clean-up the PRIMET state machine, error conditions and data logging.
- Update PRIMET keywords and introduce glitch value in header
- Clean-up/harmonize the PRIMET Gui's
- Re-start the laser frequency stabilization for the next commissioning after repairing the faulty wavemeter. Perform an absolute calibration of the laser frequency (to be contracted to Menlo GmbH?)
- Confirm that PRIMET can be used at 4kHz (instead of 8kHz) to avoid OPD jumps on the rmn.
- generate CR for the automatic computation of the Pacman instrument pointing offset
- Insure that a spare phasemeter can be produced at Paranal and Issue doc with phase meter modifications

Meeting 30/3/2011 (RFR,LAN,SLE) (post-com14)

- SELINS at VLTi startup: solved in Control Model, to be tested again by RFR
- Stabilization with LSP=0 (get stuck in stabilizing): solved in control mode; to be tested by RFR
- Startmet not interpreted if already in recording: maintain solution of Com14: pacman has to do stopmet
- Define if pmcs goes in error when 1 beam is lost: for the moment yes
- Log substate in logmonitor: to be implemented by RFR

Trouble shooting:

- Wrong M16 configuration after DLCS build. In addition, "M16gui" may indicate the correct target position but in reality the M16 may be at another position!. Need to "RE-init" each M16 sequentially from M16gui
- Need to init/standby/online the fsm/vsm's of AT4:
 - o Behavior:flux ~ OK on the quadcell but pupil tracking loses track after few seconds
 - o Looking on the beam profiler, one could see that the beam was significantly deformed. (but not moving periodically as seen once in COM13 during day-time)

3 ARCHIVED CONFIGURATION AFTER COM14

- [DDL](#): Rate=1000 microns/s ; Acceleration=8000 microns/s² (mechanical)
- DL: Rate=0.005m/sec ; Acceleration 1.8 m/s² (mechanical)
- "distATPupFixVCM" 3(AT4) 67.77m
- Pacman Instrument pointing offsets valid for Com14

IP _____ Q _____ Beam _____ Instrument Pointing Offset (PACMAN) _____ [pacmanPoffs->pofTable]
IP3 _____ Q1 (62.41;52.79) _____ 2 _____ (-159.39;-27.15) _____ table line 1
IP1 _____ Q2 (64.18;53.44) _____ 1 _____ (-150.81;-1.62) _____ table line 0
IP4 _____ Q3 (62.84;62.3) _____ 2S _____ (-23.81;-17.23) _____ table line 7
IP2 _____ Q4 (65.51;62.78) _____ 1S _____ (-18.01;21.07) _____ table line 6
_____ all other table line=0

Filter H, IFO dichroics, IFOA mirror

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4 ACU POSITIONS

Date	FSUA		FSUB	
	Autotest (microrad)	Scientific (microrad)	Autotest (microrad)	Scientific (microrad)
COM13			IP2 X=-235.9 Y=115.5 -- IP4 X=10.70 Y=223.9	
COM14 23/1	IP1 X=-84.05 Y=-24.79 IP3 X=-665.7 Y=476.2 Total flux~87000 ADU	IP1 X=-122.8 Y=-20 IP3 X=-649.9 Y=481.9	IP2 X=-255.4 Y=123.6 -- IP4 X=32.15 Y=222.3 Total flux=87000 ADU	IP2 X=-245.7 Y=117.2 IP4 X=37.08 Y=222.5

5 VCM ORIGIN POSITIONS FOR PRIMET PUPIL TRACKING

IP1 AT3-A			
	COM12	IP1 TRA=5.6 PGA=1 SUM=2.2V AT3_VCMA X=29.8 Y=12.75	
	COM13	IP1 TRA=5.6 PGA=1 SUM=2.6V AT3_VCMA X=28.6 Y=12.5	1D along +U
	COM14	IP1 TRA=1 PGA=10 SUM=4 V AT3_VCMA X=29.07 Y=12.52	22/1: updated dbcfg
IP2 AT3-B			
	COM12	IP2 TRA=1 PGA=100 SUM=6.4V AT3_VCMB X=19.85 Y=21.37	
	COM13	IP2 TRA=1 PGA=100 SUM=4.7V AT3_VCMB X=17.66 Y=20.93	
	COM14	IP2 TRA=1 PGA=100 SUM=6.5V AT3_VCMB X=17.8 Y=20.55	22/1: updated dbcfg
IP3 AT4-A			
	COM12	IP3 TRA=5.6 PGA=1 SUM=2.9V AT4_VCMA X= 21.8 Y=8.6	
	COM13	IP3 TRA=5.6 PGA=1 SUM=3.15V AT4_VCMA X= 25.08 Y=9.7	$\Delta x \sim 3.3$; 5D along +U
	COM14	IP3 TRA=1 PGA=10 SUM=3.8V AT4_VCMA X=26.5 Y=9.12	22/1: updated dbcfg
IP4 AT4-B			
	COM12	IP4 TRA=1 PGA=100 SUM=6.8V AT4_VCMB X=26.3 Y=23.8	
	COM13	IP4 TRA=10 !!PGA=100!! SUM=0.8V AT4_VCMB X=29.4 Y=25.2	3D along -U
	COM14	IP4 TRA=1 PGA=100 SUM=9.1 V AT4_VCMB X= 30.45 Y=25.15	22/1: updated dbcfg

1/2/2011: day-time with fsm alignment offsets W=+/-100

AT3 VCMA=29.8;13.8 VCMB=19.3;22.2

AT4 VCMA=27;9.5 VCMB=30.6;26.1

Using equivalent Gains PGA=TRA=1:

PRIMETA IP1-quad1 (AT3-A) -----0.4V-----S IP3-quad2 (AT4-A) -----0.51V-----P	PRIMETB IP2-quad3 (AT3-B) ----0.065V----S IP4-quad4 (AT4-B) ----0.091V----P
--	---

Leading to IP3/IP4=5.6 and IP1/IP2=6.15

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Currently, there is about 6 times less flux on the quadcells of PRIMETB than on the quadcells of PRIMETA. However, this does not affect operation.

The large beam wandering experienced on AT4-J2-B (4 diameters in few seconds) during COM13 (day-time) did not occur during COM14.

6 OPTICAL SIGNALS

pmacq version (0.79) installed to use relaxed error conditions

PRIMET A on sky	
DC_REF_650=0.7 RMS_REF_650=0.158 V_REF_650~ 0.32	DC_PROBE_650 =0.2 RMS_PROBE_650 = 0.094 V_PROBE_650= 0.7
PRIMET B on sky	
DC_REF_450=0.2 RMS_REF_450=0.125 V_REF_450~ 0.9	DC_PROBE_450= 0.6 RMS_PROBE_450= 0.325 V_PROBE_450~ 0.78
PRIMET A on Marcel	
DC_REF_650=0.6 RMS_REF_650=0.137 V_REF_650= 0.3	DC_PROBE_650 =0.68 RMS_PROBE_650 =0.220 V_PROBE_650= 0.48
PRIMET B on Marcel	
DC_REF_450=0.142 RMS_REF_450=0.091 V_REF_450= 0.9	DC_PROBE_450= 0.35 RMS_PROBE_450= 0.066 V_PROBE_450= 0.25

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7 TEST OF THE ROBUSTNESS OF PRIMET VS. DDL MOTION/SWAP

7.1 Impact of DDL1 rate/acceleration limits and SETAPOS steps (24/1/2011)

- * Rate limiter DDL1 3000 acceleration 10000 (mechanical)-> step SETAPOS 10 mm (mechanical) **OK**
- * Rate limiter DDL1 5000 acceleration 10000 (mechanical)-> step SETAPOS 1 mm (mechanical) **OK**
- * Rate limiter DDL1 8000 acceleration 10000 (mechanical)-> step SETAPOS 1 mm (mechanical) **OK**
- * Rate limiter DDL1 8000 acceleration 10000 (mechanical)-> step SETAPOS 2 mm (mechanical) **OK**
- * Rate limiter DDL1 8000 acceleration 10000 (mechanical)-> step SETAPOS 5 mm (mechanical) --> **glitch**
- * Rate limiter DDL1 7000 acceleration 10000 (mechanical)-> step SETAPOS 5 mm (mechanical) --> **glitch**
- * Rate limiter DDL1 6000 acceleration 10000 (mechanical)-> step SETAPOS 5 mm (mechanical) --> **glitch**
- * Rate limiter DDL1 5000 acceleration 10000 (mechanical)-> step SETAPOS 5 mm (mechanical) --> **glitch**
- * Rate limiter DDL1 5000 acceleration 10000 (mechanical)-> step SETAPOS 4 mm (mechanical) --> **OK**
- * Rate limiter DDL3 5000 acceleration 10000 (mechanical)-> step SETAPOS 4 mm (mechanical) --> **OK**
- * Rate limiter DDL3 8000 acceleration 10000 (mechanical)-> step SETAPOS 3 mm (mechanical) --> **OK**
- * Rate limiter DDL3 8000 acceleration 10000 (mechanical)-> step SETAPOS 4 mm (mechanical) --> **glitch**

7.2 Observation of the PRIMET laser beam of IP4 on the beam profiler during DDL1 and DDL2 swap (1/2/2011)

Configuration: PRIMET operated during day time to AT3-G2 and AT4-J2. DL2 and DL4 are fixed at 14m.

DDL3 is in standby

DDL4 is at OPL=0 but the position loop is opened (DDL metrology laser too weak)

Pupil tracking is ON.

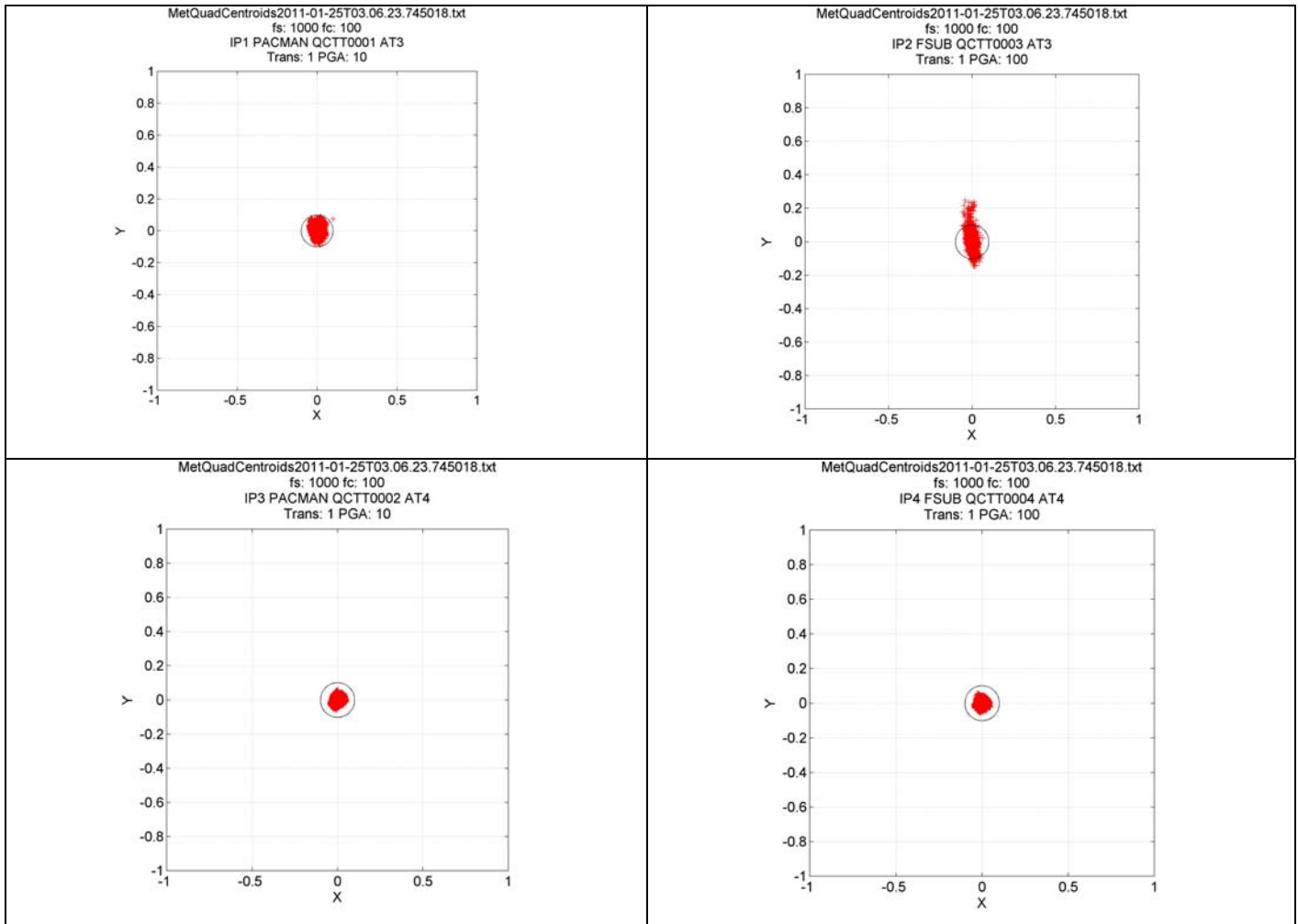
DDL1 and DDL2 are manually swapped on the [0 to 15mm] mechanical range using the SETAPOS command. DDL1 & 2 start resonating for speed $\sim >4500$ microns/s (mech), leading to a clear acoustic noise inside the VLTI laboratory. Vibrations are transmitted through the DDL supporting table and leads to strong lateral displacement of IP4 as seen on the beam profiler. (see also DDL vibration report *VLTISE-PHA-2011-01.pdf*).

This experience confirmed that the DDL speed and acceleration limits shall not exceed respectively 1000 microns/s (mechanical) and 8000 microns/s² (mechanical).

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7.3 Examples of the impact of DDL swaps

Swap DDL1 and DDL2 only(3&4 are fixed); 28 mm/ rate limiter=3000



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8 TEST OF THE ROBUSTNESS OF PRIMET VS. DL MOTION

8.1 Response to DL offsets for various DI rate/acceleration limits (22/1/2011)

Several cases were tested as reported below.

The speed limit is more critical than the acceleration limit.

Acceleration limit, a , $a(\text{mech.}, \text{m/s}^2) \rightarrow$	0.05	0.1	0.15	0.15	0.2	0.2	0.2	1.8
Speed limit $v(\text{mech.}, \text{m/s}) \rightarrow$	0.01 (v reached after $v/a=200\text{ms}$)	0.01 (after 100ms)	0.01 (after 66ms)	0.008 (after 53ms)	0.005 (after 25ms)	0.008 (after 40ms)	0.01 (after 50ms)	0.005 (after 3msec)
ZPD Offset, $\downarrow Z(\text{OPL}, \text{m})$								
1.e-3							OK	
5.e-3	OK, ^(*) (Z reached after $\sqrt{Z/2a}=220\text{ms}$)	Glitch (Z reached $=160\text{ms}$)	Glitch (Z reached $=130\text{ms}$)	OK (Z reached $=130\text{ms}$)			Glitch (Z reached $=111\text{ms}$)	
10.e-3	OK (Z reached $=316\text{ms}$)			OK (Z reached $=180\text{ms}$)	OK (Z reached $=160\text{ms}$)		Glitch (Z reached $=160\text{ms}$)	
40.e-3	OK (Z reached $=630\text{ms}$)			OK (Z reached $=365\text{ms}$)		OK (Z reached $=316\text{ms}$)		

(*): Z too small to reach the speed limit.

8.2 Study cases during on-sky operation

8.2.1 Tests on 25/1/2011

DL2 tracking ~89m

DL4=11m

DDL rate limiter is 5000 acceleration limit=10000

Acquisition; lab guiding; FSU dark and flat

Large scan done with DL2 to see fringes on both fsuA and FSUB ,

ZPDOffset=-0.02 Scan Amplitude=0.04 Scan Period=800s -> speed=0.16/800=200microns/sec [1 cm in 50sec]

-rw-rw-rw- 1 vx vlt 1225433 Jan 25 02:27 lprmacPhotodiodes2011-01-25T02.20.03.903988.txt

-rw-rw-rw- 1 vx vlt 2545431 Jan 25 02:27 lprmacPhaseMeter2011-01-25T02.20.03.903988.txt

-rw-rw-rw- 1 vx vlt 6164 Jan 25 02:27 lprmacFringe2011-01-25T02.20.03.903988.txt

-rw-rw-rw- 1 vx vlt 1225433 Jan 25 02:27 lprma2Photodiodes2011-01-25T02.20.03.906215.txt

-rw-rw-rw- 1 vx vlt 2638098 Jan 25 02:27 lprma2PhaseMeter2011-01-25T02.20.03.906215.txt

-> OK no glitch

IP1 (AT3-A)-> ~OK

IP2 (AT3-B) -> spike at 0.25 when starting the ZPD offset

IP3 (AT4-A) -> very good

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IP4 (AT4-B) -> very good

-> as expected IP1 and IP2 (connected to DL2) have larger residuals.

Nevertheless, the signature of the ZPD search is larger on IP2 than on IP1.

TBC if this is only the results of the different gains of the controllers as reported below

% Parameters of the controllers

% IP3 IM Gain A1 A2 B1 B2 1 0 0 -1 0.04 -0.875 0 -1 0

% IP1 IM Gain A1 A2 B1 B2 -1 0 0 -1 0.02 -0.875 0 -1 0

% IP4 IM Gain A1 A2 B1 B2 -1 0 0 -1 0.03 -0.6667 0 -1 0

% IP2 IM Gain A1 A2 B1 B2 1 0 0 -1 0.03 -0.6667 0 -1 0

do

STOPlabguiding

PRIMA SWAP (i.e. AT + DDL)

START labguiding as such

enginnering files (at the end but maybe not in the file, start fringe scan with DL2)

-> OK no glitch

-rw-rw-rw- 1 vx vlt 2465433 Jan 25 02:39 lprmacPhotodiodes2011-01-25T02.37.03.345127.txt

-rw-rw-rw- 1 vx vlt 5213456 Jan 25 02:39 lprmacPhaseMeter2011-01-25T02.37.03.345127.txt

-rw-rw-rw- 1 vx vlt 11787 Jan 25 02:39 lprmacFringe2011-01-25T02.37.03.345127.txt

-rw-rw-rw- 1 vx vlt 5369343 Jan 25 02:39 lprma2PhaseMeter2011-01-25T02.37.03.347280.txt

-rw-rw-rw- 1 vx vlt 23327647 Jan 25 02:40 MetQuadCentroids2011? -01-25T02.37.04.435018.txt

-rw-rw-rw- 1 vx vlt 1973398 Jan 25 02:40 MetQuadCorrections2011? -01-25T02.37.04.435018.txt

Lprmac signal:

swap-> provides step of 2.7mm on AminusB, done in ~0.5 sec

max speed~10mm/s

rate limit=5mm/s(mech) for 1 DDL->v_OPL=10mm/s

both DDL1&2 are swapped simultaneously-> therefore the max.DeltaL speed should reach 2.v_OPL=20mm/s...

-> however, acc.limit=20mm/s(OPL) and rate limit=10mm/s(OPL)

so it takes 0.5 sec to reach the rate limit for 1 DL since the step is small, we actually never reach the speed limit

Max acceleration DeltaL? ~1m/s

IP1 (AT3-A)-> ~OK small signature of swap ~0.15 pk

IP2 (AT3-B) -> ~OK small signature of swap ~0.15 pk

IP3 (AT4-A) -> clear oscillation during ~ 20sec at 100Hz amplitude 0.12

IP4 (AT4-B) -> exactly same behavior as IP3 !

Swap/unswap with DDL only (takes ~10 sec), AT&DL are ignored

DDL rate limiter is 5000 acceleration limit=10000

swap

-rw-rw-rw- 1 vx vlt 1187308 Jan 25 02:58 lprmacPhaseMeter2011-01-25T02.58.20.298280.txt

-rw-rw-rw- 1 vx vlt 2972 Jan 25 02:58 lprmacFringe2011-01-25T02.58.20.298280.txt

-> lprma2: no glitch

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lprma2: initial speed $v_{\Delta L}=5$ mm/s (DL2 blind tracking), then increase to speed $v_{\Delta L}=15$ mm/s after DDL2 start moving so the rate limit DDL2 is effectively 10mm/s (OPL)= 5mm/s (mech)

Phase Meter Data

==> Filename: lprma2PhaseMeter2011-01-25T02.58.20.300426.txt

Sampling frequency= 500 Hz

Number of samples= 17285

Sampling= 5.000000e+002 Hz P_V Sampling= 2.000000e-006 sec

DeltaL Mean= 2.698561e-002 m

DeltaL PV= 1.805757e-001 m

DeltaL rms= 5.385451e-002 m

Status Not OK: 0

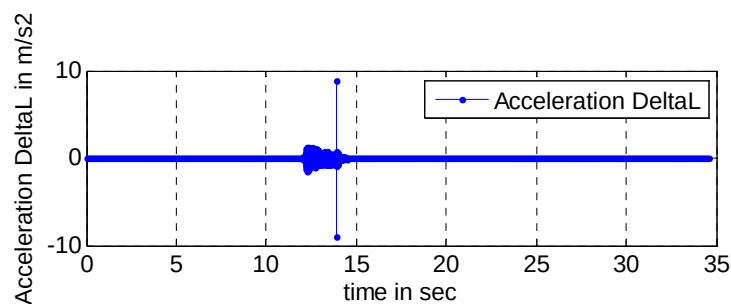
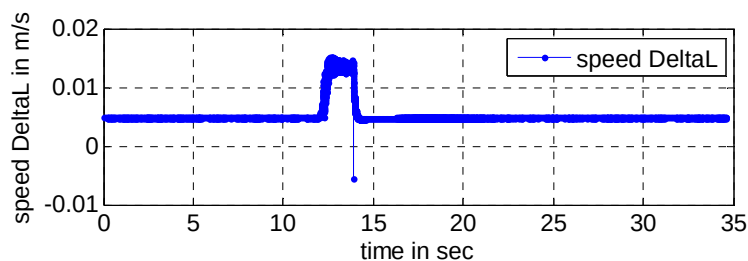
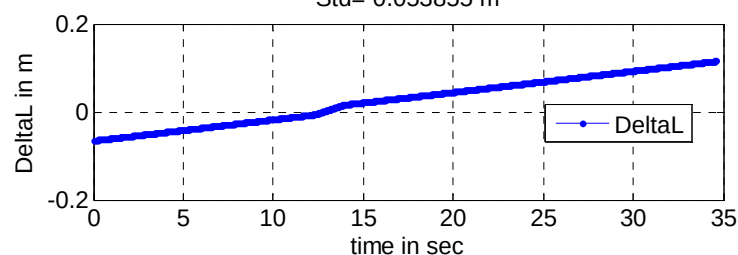
lprma2PhaseMeter2011-01-25T02.58.20.300426.txt

Fs=500 Hz

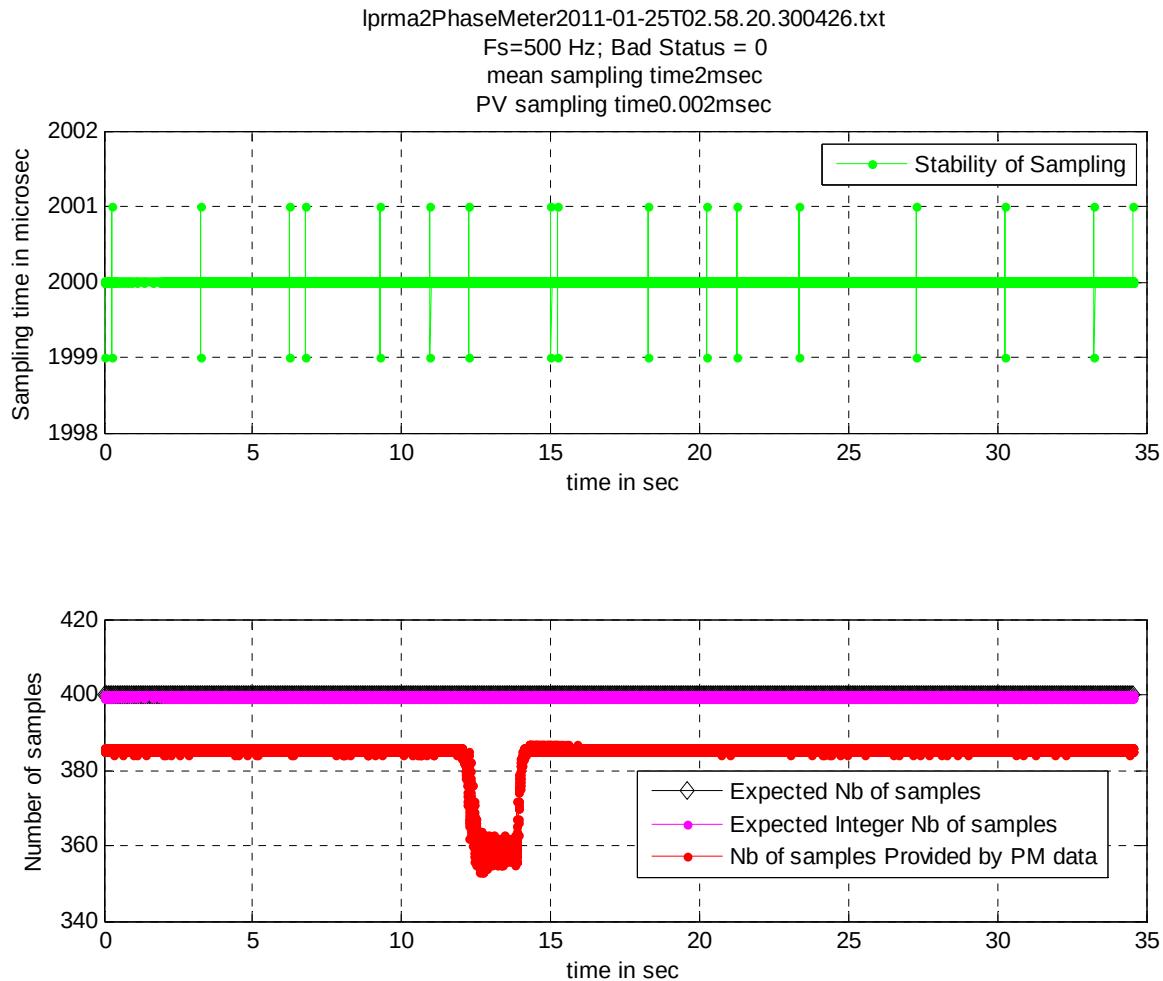
Bad Status = 0

PV= 0.18058 m

Std= 0.053855 m



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-> **lprmac**: glitch 650kHz/200kHz (PRIMET A), meaning that it is due to DDL1, because DDL3 is fixed and the DI's were ignored

Amplitude swap= 28 mm (OPL) in ~2 sec

max.speed $v_{\Delta L} \sim 15\text{-}20\text{ mm/s}$; Now this matches the expectations because the step is big enough to reach the speed limit.

Phase Meter Data

==> Filename: lprmacPhaseMeter2011-01-25T02.58.20.298280.txt

Sampling frequency= 500 Hz

Number of samples= 13779

Sampling= $5.000000\text{e}+002$ Hz P_V Sampling= $6.000000\text{e}-006$ sec

DeltaL Mean= $1.441724\text{e}-002$ m

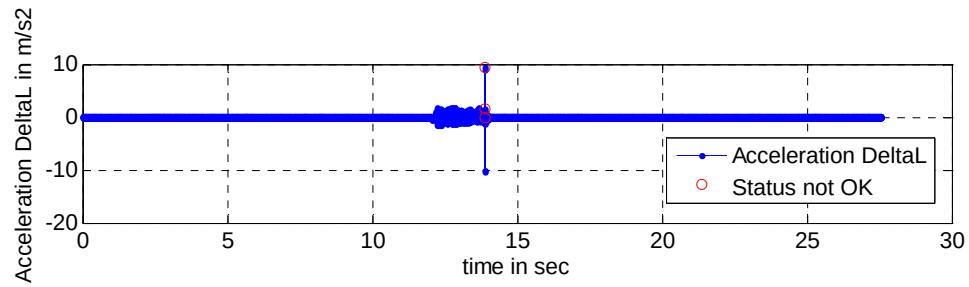
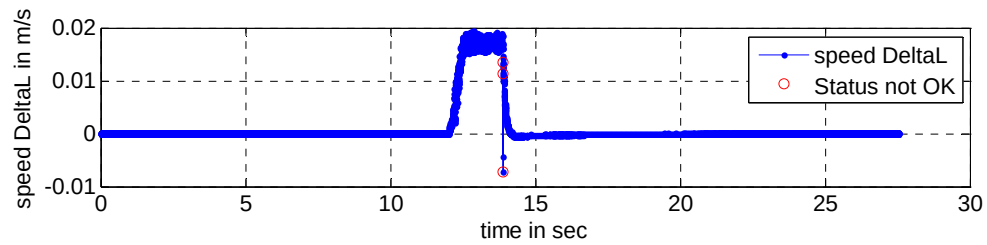
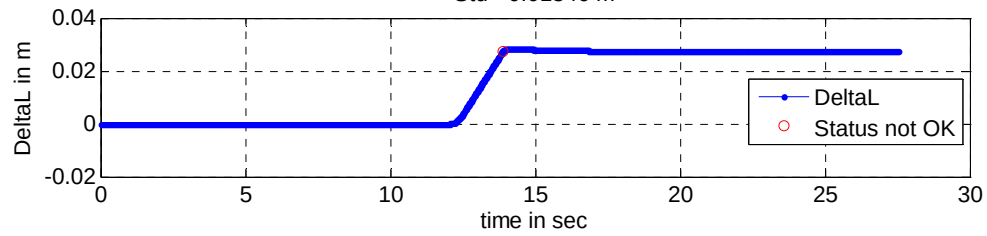
DeltaL PV= $2.843663\text{e}-002$ m

DeltaL rms= $1.345983\text{e}-002$ m

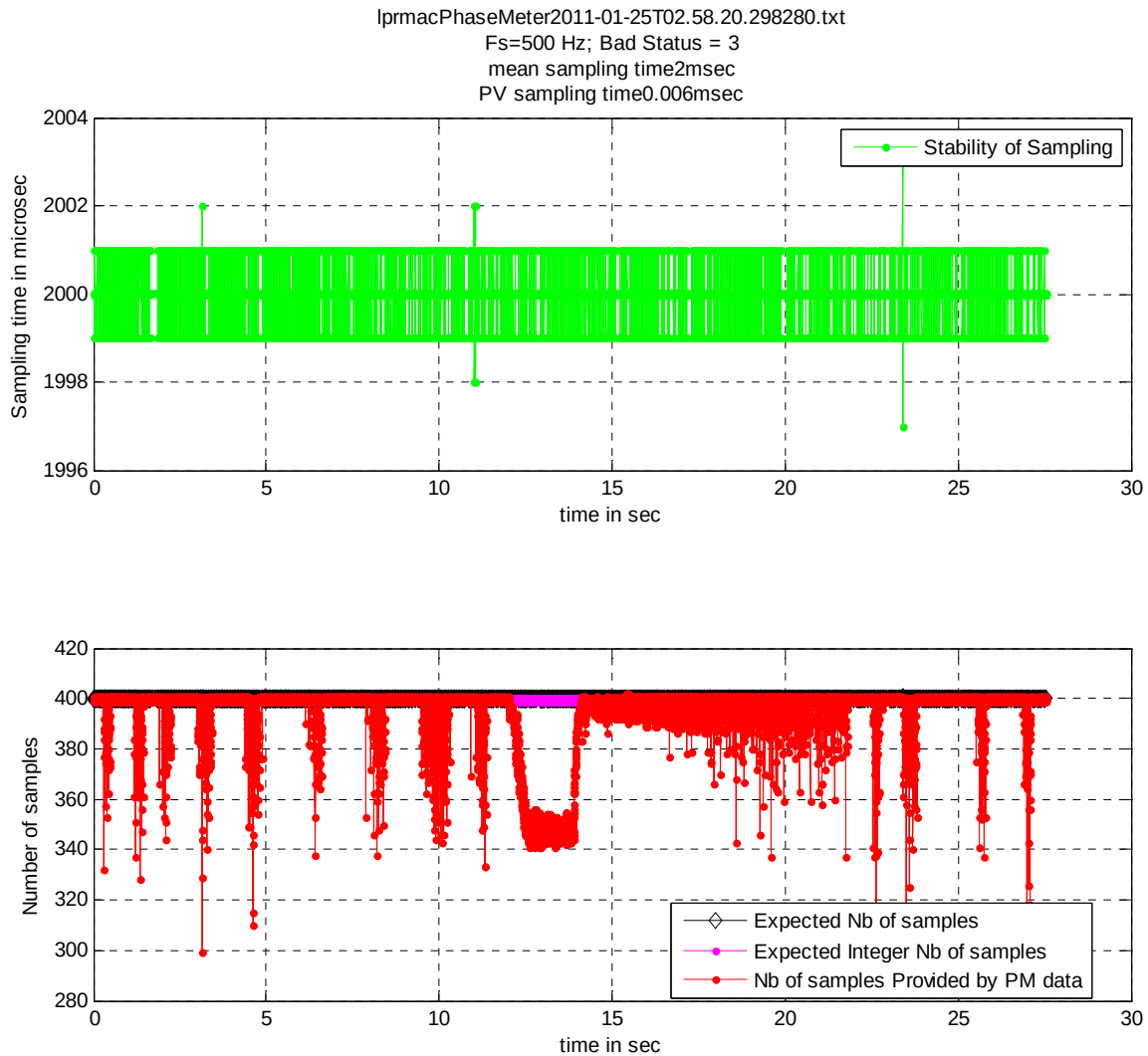
ESO	Prima Metrology 9th Technical Report (22/1 to 2/2/2011), as part of PRIMA COM14	Doc:	VLT-TRE-ESO-15730-5387
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Status Not OK: 3

lprmacPhaseMeter2011-01-25T02.58.20.298280.txt
Fs=500 Hz
Bad Status = 3
PV= 0.028437 m
Std= 0.01346 m



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IP1 (AT3-A)-> fairly good (except several outliers at $R=0.35$) $R < 0.1$...: in contradiction with glitch 650kHz attributed to DDL1...The measurement may not be completely reliable when beam is moving a lot.

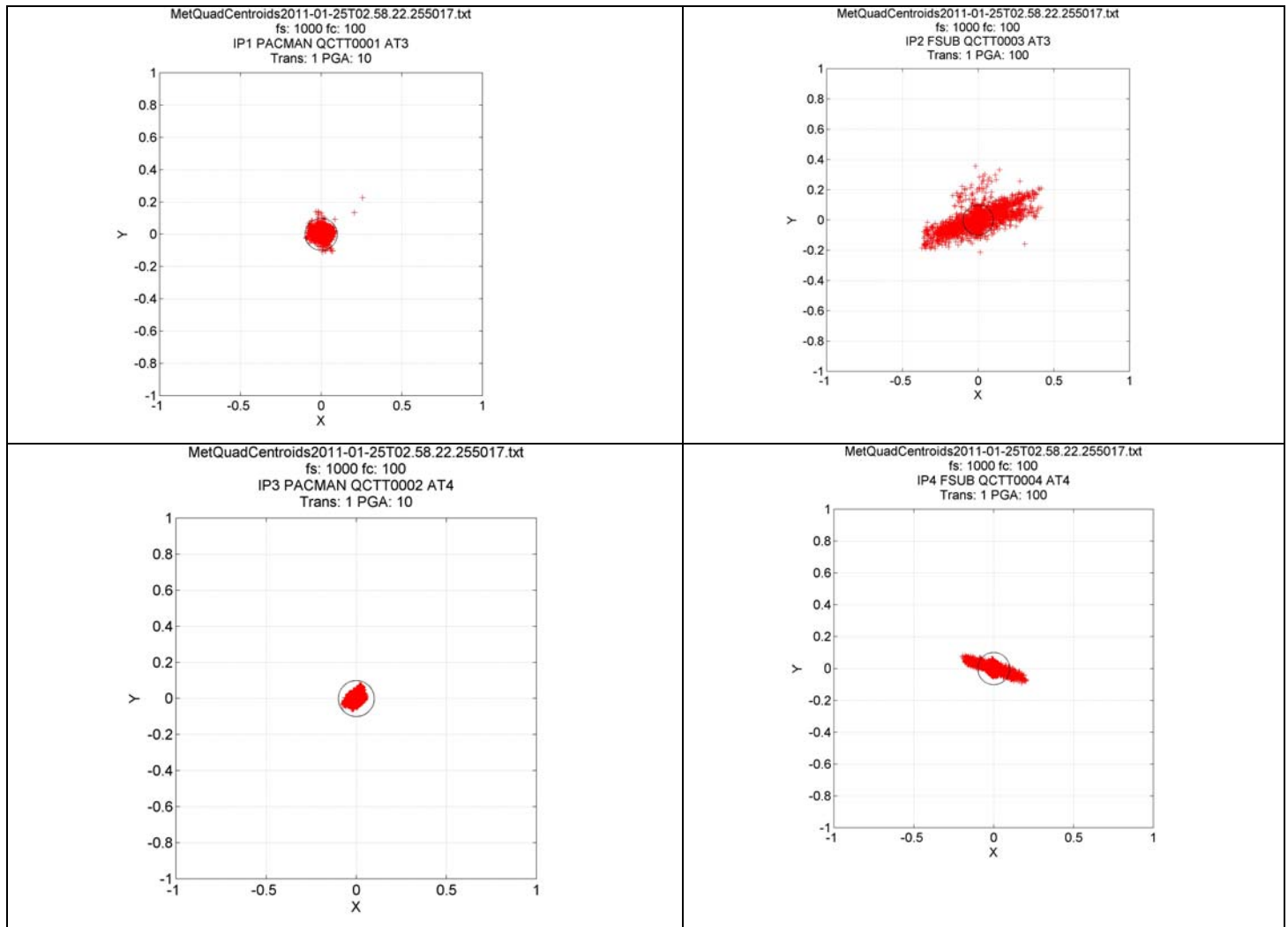
IP2 (AT3-B) -> very large peak at $R=0.45$ mostly along X: but not enough to glitch on lprma2....

IP3 (AT4-A) -> ~ OK, Peak at $R \sim 0.12$

IP4 (AT4-B) -> large peak at $R=0.2$ mostly along X

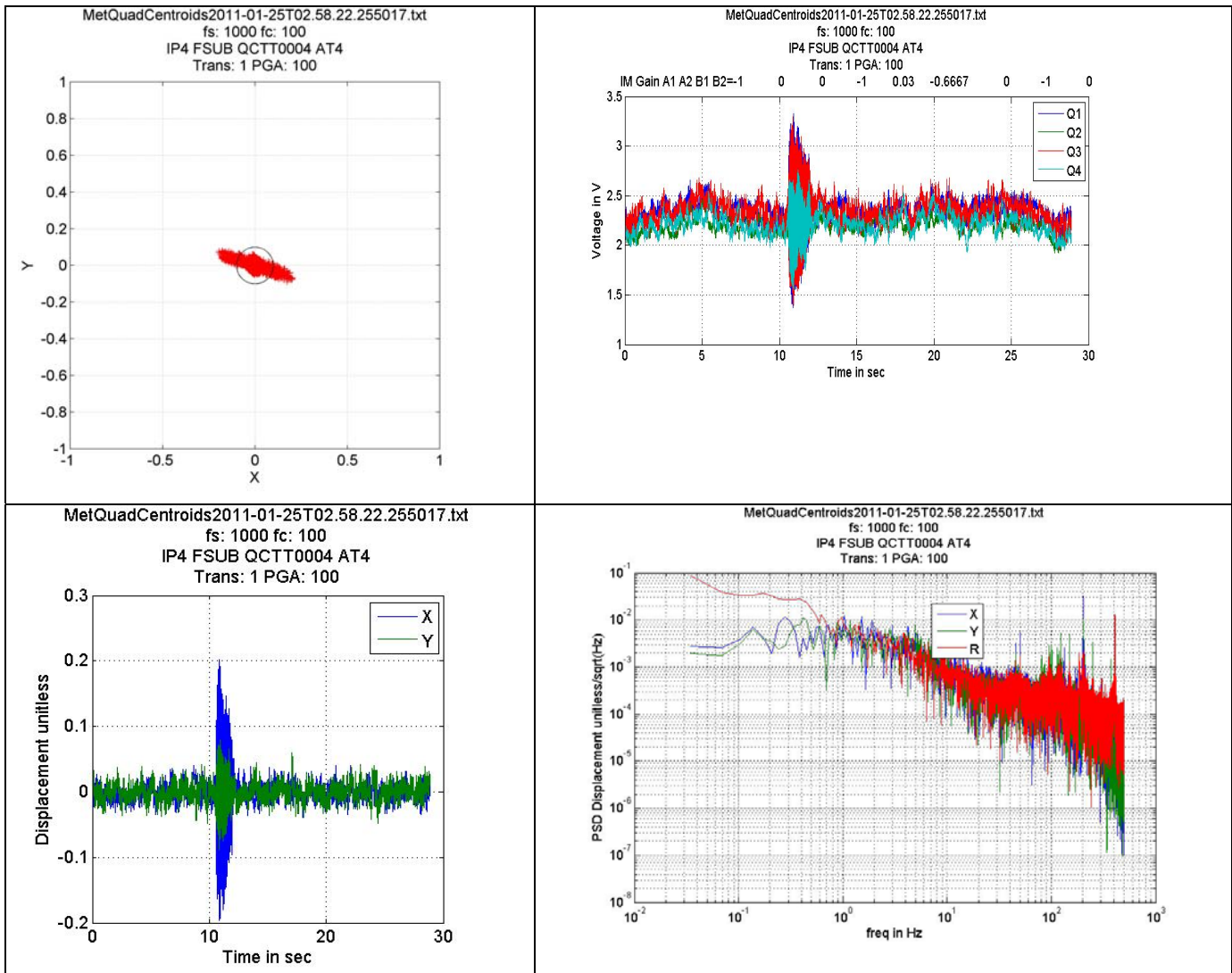
ESO	Prima Metrology 9th Technical Report (22/1 to 2/2/2011), as part of PRIMA COM14	Doc:	VLT-TRE-ESO-15730-5387
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Disturbance on all IPs during swap of DDL1 and DDL2
DDL rate limiter is 5000 acceleration limit=10000



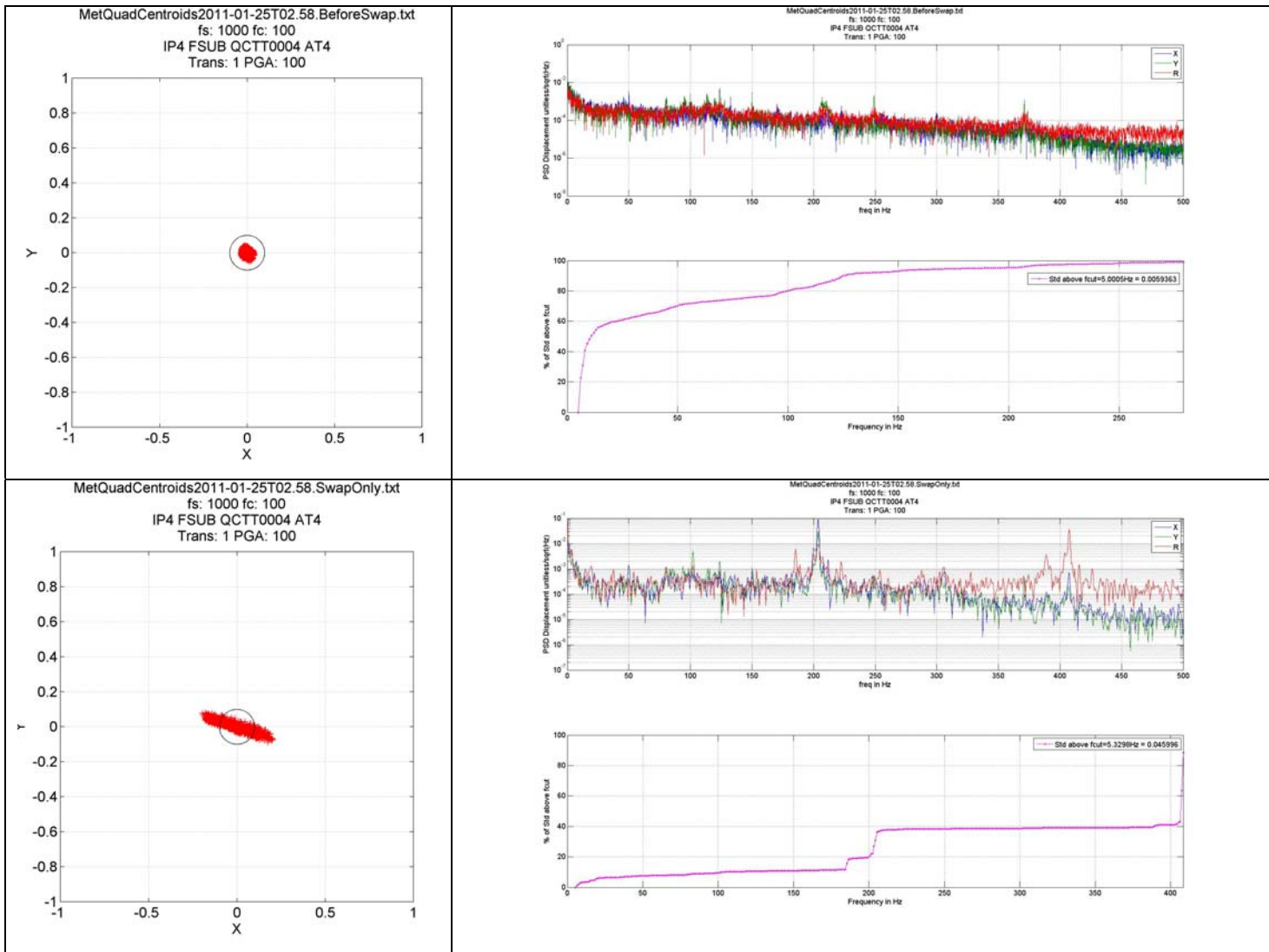
ESO	Prima Metrology 9th Technical Report (22/1 to 2/2/2011), as part of PRIMA COM14	Doc:	VLT-TRE-ESO-15730-5387
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Disturbance on IP4 during swap of DDL1 and DDL2
DDL rate limiter is 5000 acceleration limit=10000



→ Eigen frequency=200Hz

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unswap

-rw-rw-rw- 1 vx vlt 1202104 Jan 25 03:00 lprmacPhotodiodes2011-01-25T02:59.37.245516.txt

-rw-rw-rw- 1 vx vlt 2577993 Jan 25 03:00 lprmacPhaseMeter2011-01-25T02:59.37.245516.txt

-rw-rw-rw- 1 vx vlt 5960 Jan 25 03:00 lprmacFringe2011-01-25T02:59.37.245516.txt

-> no glitch lprmac/lprma2

although the characteristics of unswap=swap as verified on lprmac/lprma2

IP1 (AT3-A)-> Bad, outlier peak at 0.35, otherwise Rpk~0.25

IP2 (AT3-B) -> Bad, outlier peak at 0.4, otherwise Rpk~0.2

IP3 (AT4-A) -> ~good, only small Rpk=0.1

IP4 (AT4-B) -> ~good, only small Rpk=0.1.

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swap-

-rw-rw-rw- 1 vx vlt 545120 Jan 25 03:02 lprmacPhotodiodes2011-01-25T03.01.36.446192.txt
-rw-rw-rw- 1 vx vlt 1157418 Jan 25 03:02 lprmacPhaseMeter2011-01-25T03.01.36.446192.txt
-rw-rw-rw- 1 vx vlt 2963 Jan 25 03:02 lprmacFringe2011-01-25T03.01.36.446192.txt

->>1x glitch (450 kHz/200kHz) on lprmac and lprma2

put back DDL rate limiter to 3000

unswap DDL only ->OK

-rw-rw-rw- 1 vx vlt 701576 Jan 25 03:05 lprmacPhotodiodes2011-01-25T03.04.45.322491.txt
-rw-rw-rw- 1 vx vlt 1527572 Jan 25 03:05 lprmacPhaseMeter2011-01-25T03.04.45.322491.txt
-rw-rw-rw- 1 vx vlt 3625 Jan 25 03:05 lprmacFringe2011-01-25T03.04.45.322491.txt

swap DDL only->OK

-rw-rw-rw- 1 vx vlt 606784 Jan 25 03:06 lprmacPhotodiodes2011-01-25T03.06.22.332532.txt
-rw-rw-rw- 1 vx vlt 1288197 Jan 25 03:06 lprmacPhaseMeter2011-01-25T03.06.22.332532.txt
-rw-rw-rw- 1 vx vlt 3251 Jan 25 03:06 lprmacFringe2011-01-25T03.06.22.332532.txt

IP1 (AT3-A)-> good

IP2 (AT3-B) -> not to good, Rpk=0.25; vibration at R=0.15 level during ~2.5 sec; mainly vertical

IP3 (AT4-A) -> very good

IP4 (AT4-B) -> very good

swap Telescopes Only (takes 20 sec)

swap-> ok

-rw-rw-rw- 1 vx vlt 1187303 Jan 25 03:09 lprmacPhotodiodes2011-01-25T03.08.21.317135.txt
-rw-rw-rw- 1 vx vlt 2584765 Jan 25 03:09 lprmacPhaseMeter2011-01-25T03.08.21.317135.txt
-rw-rw-rw- 1 vx vlt 5959 Jan 25 03:09 lprmacFringe2011-01-25T03.08.21.317135.txt

IP1 (AT3-A) -> good , see vibrations during 20 sec but with much smaller amplitude compared to IP3/IP4

IP2 (AT3-B) -> good, see vibrations during 20 sec but with much smaller amplitude compared to IP3/IP4

IP3 (AT4-A) -> vibrations during ~ 20 sec R_pk~0.15

IP4 (AT4-B) -> vibrations during ~ 20 sec R_pk~0.15

unswap->OK

-rw-rw-rw- 1 vx vlt 1773726 Jan 25 03:11 lprmacPhotodiodes2011-01-25T03.10.16.174207.txt
-rw-rw-rw- 1 vx vlt 3728983 Jan 25 03:11 lprmacPhaseMeter2011-01-25T03.10.16.174207.txt
-rw-rw-rw- 1 vx vlt 8443 Jan 25 03:11 lprmacFringe2011-01-25T03.10.16.174207.txt

be careful, after unswap (>20 sec), start field stab , but labguiding failed and the start went away-> fsm went away->glitch

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represet on same object done :

swap-> OK

-rw-rw-rw- 1 vx vlt 1348023 Jan 25 03:22 lprmacPhotodiodes2011-01-25T03.21.02.574193.txt

-rw-rw-rw- 1 vx vlt 2847384 Jan 25 03:22 lprmacPhaseMeter2011-01-25T03.21.02.574193.txt

-rw-rw-rw- 1 vx vlt 6693 Jan 25 03:22 lprmacFringe2011-01-25T03.21.02.574193.txt

Conclusion

- * Primet is compatible with a Simple scan DL2 (offset 2cm; amplitude 4 cm, speed 200microns/s)

- * PRIMA swap:

- o object 1: swap amplitude 2.7 mm only; compatible with DDL rate limiter 5000

- o object 2: swap amplitude 27 mm; not compatible with DDL rate limiter 5000; but OK with rate limiter

back to 3000

- o OK w.r.t dark/flat calibration scheme using IRIS background feature

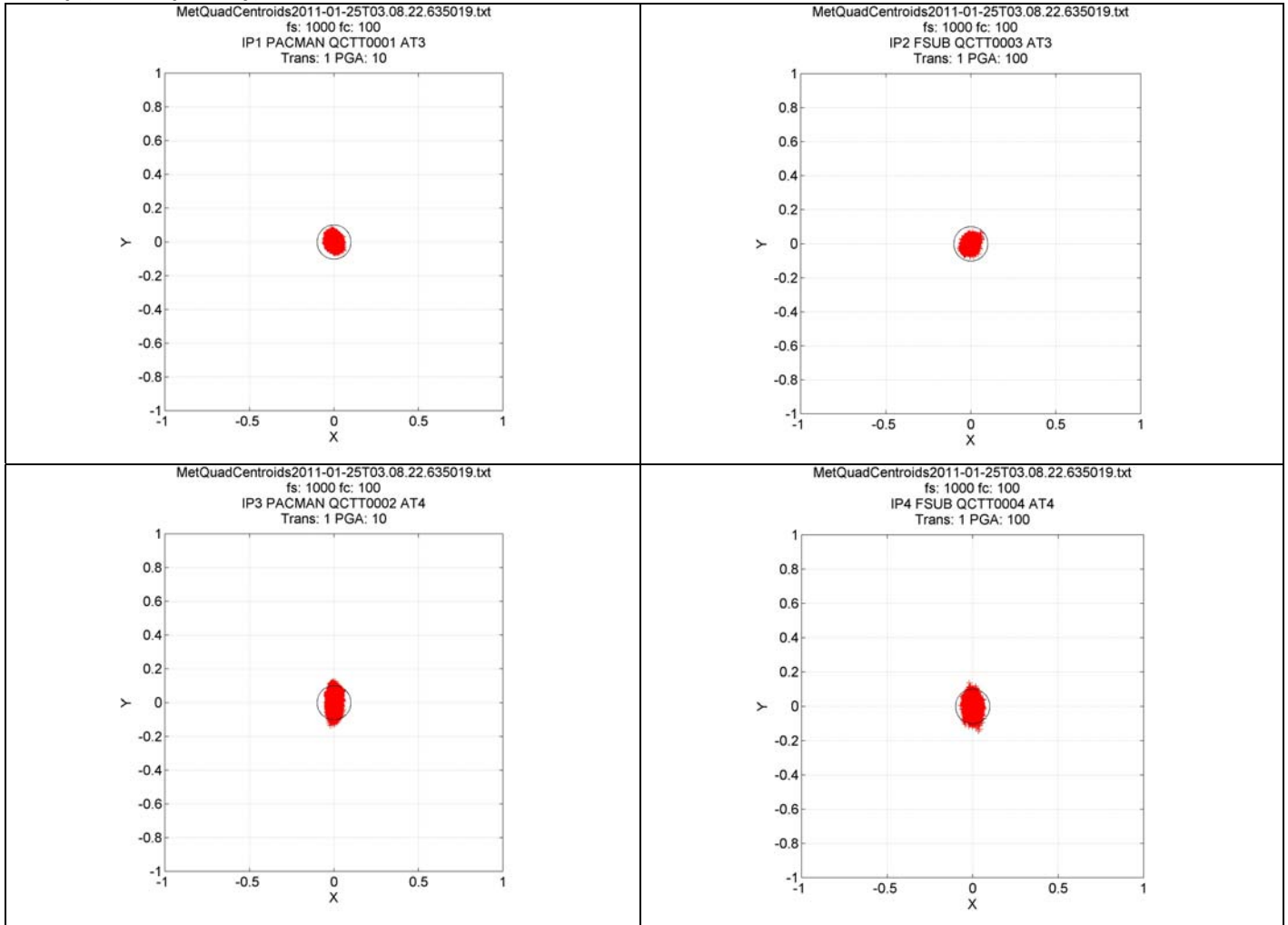
- * Comparing the effect of DDL swap and telescope swap

- o impact on the quadcell : AT4 degrades the pupil position more than AT3

- o the swap of DDL2 has a worse effect than a swap of DDL1 (rate=3000; amplitude opl=28mm)

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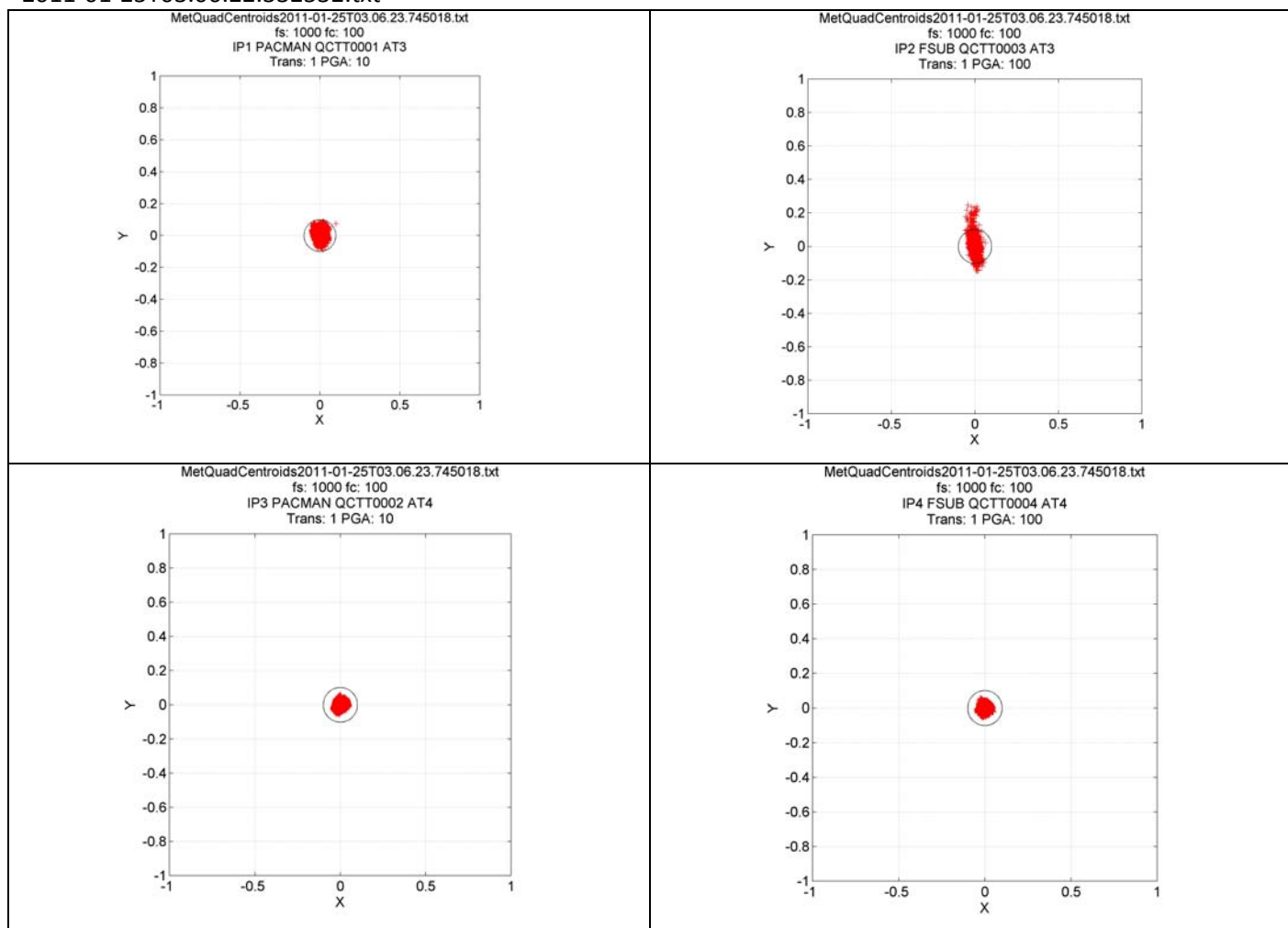
Swap (telescope only)



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Swap DDL1 and DDL2 only(3&4 are fixed); 28 mm/ rate limiter=3000

2011-01-25T03.06.22.332532.txt



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8.2.2 Tests on 28/1/2011

DL2=38m (tracking)

DL4=11m

DDL1~13mm

Rate limits changed for DL2 (tracking DL of tonight) and DL4

* rIMaxVelocity 0.008 (mech in m)-----> 0.005 (new value)

* rIMaxAcceleration 0.2 (mech in m-----> 0.18 (new value)

Rate limits for DDL1 and DDL2:

* Rate limits=2000 (Mech in microns) (instead of 3000) and acceleration limit to 8000 (Mech in microns) (instead of 10000) for both DDL

test sequence:

- * preset
- * [labguiding] (with background)
- * [dark/flat calibration/ (fringe track)]
- * [stop lab guiding]
- * swap
- * [labguiding]
- * [dark/flat calibration (fringe track)]
- * unswap

Preset

get beam on iris

no labguiding

swap from pssguisetup

guide on both ATs

-rw-rw-rw- 1 vx vlt 1608482 Jan 29 02:49 lprmacPhaseMeter2011-01-29T02.47.55.923553.txt

-rw-rw-rw- 1 vx vlt 6114 Jan 29 02:49 lprmacFringe2011-01-29T02.47.55.923553.txt

OK no glitch

Unswap pssguisetup

AT guiding

-rw-rw-rw- 1 vx vlt 1570180 Jan 29 02:52 lprmacPhaseMeter2011-01-29T02.50.59.751947.txt

-rw-rw-rw- 1 vx vlt 6122 Jan 29 02:52 lprmacFringe2011-01-29T02.50.59.751947.txt

record

swap pssguisetup

unswap pssguisetup

swap pssguisetup

unswap pssguisetup

-rw-rw-rw- 1 vx vlt 3483403 Jan 29 02:56 lprmacPhaseMeter2011-01-29T02.53.42.206029.txt

-rw-rw-rw- 1 vx vlt 13001 Jan 29 02:56 lprmacFringe2011-01-29T02.53.42.206029.txt

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-> large beam displacement on IP4 (and also on IP2) !!

Use template to scan the fringes:

Scan Amplitude=200microns ; 3points/microns-> 3 points (=3*1msec) to travel 1 microns-

>vOPL=1microns/3msec=333 microns/sec

Reduce the speed limit of the DDL:

Rate limits for DDL1 and DDL2:

* Rate limits=**1000** (Mech in microns) (instead of 3000) and acceleration limit to **8000** (Mech in microns) (instead of 10000) for both DDL

→starting from 29T02.53.42.206029, all files contain the final DL/DDL rate limits

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9 INVESTIGATION OF THE PRIMET OPL JUMPS ON THE RMN DATA

9.1 Toggling OPL

26/1/2011

Preset 1

DL2=100 m

DL4= 23 m going down

DDL1=2 mm going down

star separation~ 8arcsec_sky

Record PRIMET at 8KHz(30 SEC) and Astro at 8 kHz(30 sec)

(30 sec) Astro027_001.fits

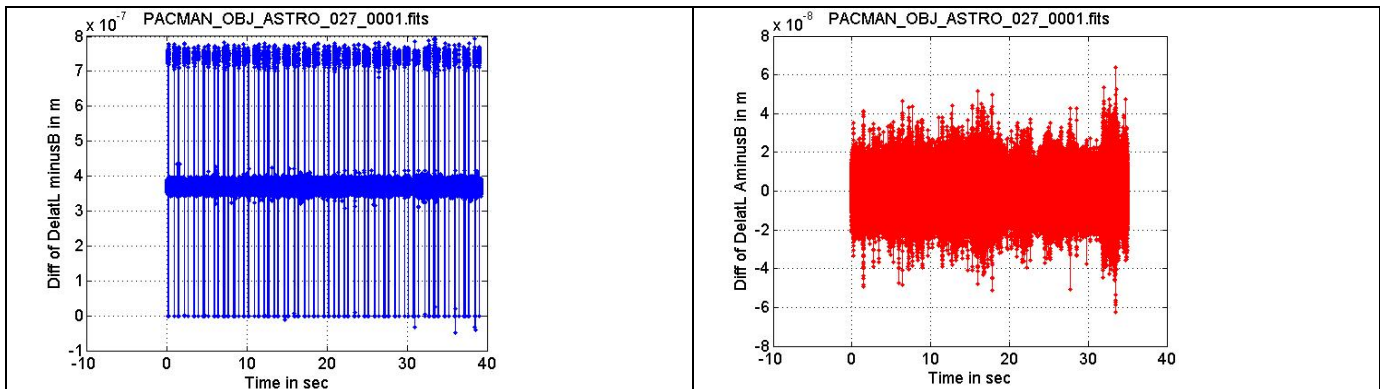
-rw-rw-rw- 1 vx vlt 9760436 Jan 27 01:28 lprma2Photodiodes2011-01-27T01.25.55.891166.txt

-rw-rw-rw- 1 vx vlt 1851392 Jan 27 01:28 lprma2PhaseMeter2011-01-27T01.25.55.891166.txt

-rw-rw-rw- 1 vx vlt 9760435 Jan 27 01:26 lprmacPhotodiodes2011-01-27T01.25.55.888694.txt

-rw-rw-rw- 1 vx vlt 20320433 Jan 27 01:27 lprmacPhaseMeter2011-01-27T01.25.55.888694.txt

-rw-rw-rw- 1 vx vlt 3367 Jan 27 01:27 lprmacFringe2011-01-27T01.25.55.888694.txt



-> jumps occurs in the PRIMETB signals recorded in the Astro(8kHz).... but nothing in the PRIMETB engineering files

31/1/2011

Set PRIMET at 2kHz record Astro file: OBJ_ASTRO_032_0001 targets test_sle1 test_sle2

Set PRIMET at 4kHz record Astro file: OBJ_ASTRO_032_0002 targets test_sle1 test_sle2

Set PRIMET at 1kHz record Astro file: OBJ_ASTRO_032_0003 targets test_sle1 test_sle2

- ➔ In all 3 cases, no jump appear on the PRIMET B and PRIMETA-B signals
- ➔ Jumps appear in the 3 files on dlfeedback but not on ddlfeedback

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Starting on 1/2/2011, the default PRIMET sampling frequency was set by the PRIMA start-up script to 4kHz (instead of 8kHz) except for the file PACMA.2011-02-05T03_30_19.888.fits=PACMAN_OBJ_ASTRO_036_0001.fits

Using the PRIMET healthcheck script running in PACMAN(see section 14.3), the following observations were made:

- If PRIMET is operated <8Khz: no toggling on minusB and AminusB
- If PRIMET is operated at 8kHz: minusB has always toggling values
- AminusB has always toggling values UNLESS opdc.dlfullOffset=0 (e.g Blind trajectory only or swap/unswap)
- opdc.dlfeedback has always toggling values
- if opdc.dlfullOffset is non zero, it has always toggling values
- ddlfeedback has toggling values unless dopdc.fulloffsets=0 (e.g during blind trajectory only or swap)

This problem was solved by R.Abuter after COM14 by reducing the PRIMET default frequency to 4 kHz and updating RMNrec.

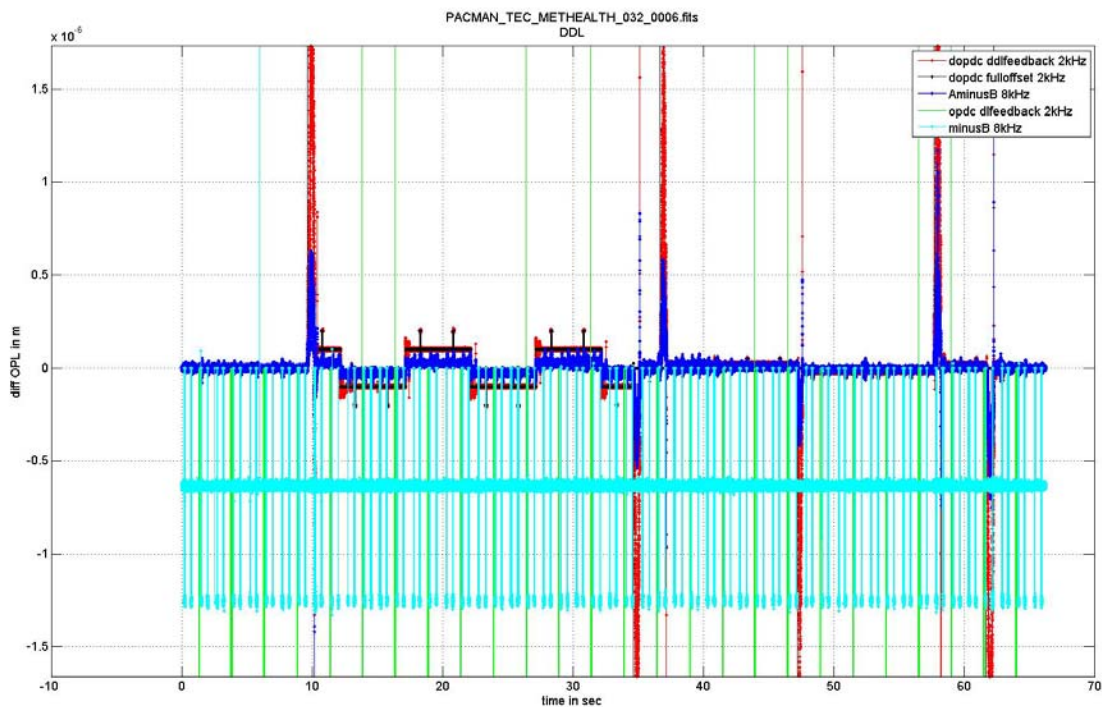


Figure 1: example of toggling errors seen on the various signals

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9.2 OPL Jumps of 3.8 microns with moving DL/DDL

This OPL jumps are attributed to FC-Overflow events.

These events should be flagged in the phase meter status but do not appear, which points to a possible mis-behavior of the phase meter firmware.

2011-01-28 04:56

Phase meter of -B → failure of SPARE2. Replaced by spare 3 with the pics of Spare2

Status of spare 3 to be checked

A closer check is done on the files where the OPL jumps of 3.8 microns were detected by J.Sahlmann.

- 16 PACMA.2011-01-28T04_25_50.326.fits <-> PACMAN_OBJ_ASTRO_028_0001.fits DL4 tracking going down
AminusB Jump T=236 ; opdc.dlfeedback= 35.8179016633767e+000
minusB Jump T=239.1
- 22 PACMA.2011-01-28T04_44_45.154.fits <-> PACMAN_OBJ_ASTRO_028_0002.fits DL4 tracking
PRIMETB 200kHz glitch at T=278.1 (last 10 samples at 8kHz=1.25 msec)
AminusB toggle detected at T=62.87 with amplitude of 3.78 microns → false jump detection
opdc.dlfeedback= 31.4425528544131e+000
→ *Δdlfeedback~ 4.4m (different from expected 11m because of false jump detection)*

Sequence Jan30:

- 45 PACMA.2011-01-30T02_26_28.982.fits <-> PACMAN_OBJ_ASTRO_030_0004.fits DL2 tracking going up
Jump T=275.7 opdc.dlfeedback= 47.0469039115842e+000
64 PACMA.2011-01-30T03_11_17.148.fits <-> PACMAN_OBJ_SCAN_030_0020.fits: T
→ Glitch T=134.9 sec PRIMET B 450kHz Probe But looks like false glitch detection
2x glitches (1 set of 17 samples and another set of 18 samples , 2 sets separated by 0.5sec)
→ Does not appear in opdlog because DATANOTVALID was defined on Feb.1 in issDIC
86 PACMA.2011-01-30T04_09_32.806.fits <-> PACMAN_OBJ_SCAN_030_0027.fits:
no glitch recorded
- 91 PACMA.2011-01-30T04_26_06.035.fits <-> PACMAN_SKY_FLAT_030_0023.fits DL2 tracking going up
Jump T=19.35 opdc.dlfeedback= 80.2424326240677e+000
Δdlfeedback= 33.1955287124835e+000~3x11m

Intermediates FC overflow must have happened outside intermediate files recorded between 30T02_26 and 30T04_26

Sequence on Feb1:

on HD66598 / HD66598B without reset:

- 41 PACMA.2011-02-01T03_07_31.893.fits <-> PACMAN_SKY_VLTIRESPONSE_032_0006.fits Jump DL4 tracking going down
04:32:59> PRI MET RESET1/2; PRI MET DATANOTVALID1/2 GlitchPLL Locked Continously until 07:01
- 45 PACMA.2011-02-01T04_34_08.356.fits <-> PACMAN_SKY_BACKGROUND_032_0004.fits
opdc.dlfeedback(1)=36.1578257118919e+000
- 46 PACMA.2011-02-01T04_34_42.995.fits <-> PACMAN_SKY_FLAT_032_0007.fits
opdc.dlfeedback(1)=36.0032811432961e+000
- 47 PACMA.2011-02-01T04_35_22.636.fits <-> PACMAN_SKY_FLAT_032_0008.fits
opdc.dlfeedback(1)=35.8266388726082e+000
- 48 PACMA.2011-02-01T04_36_57.276.fits <-> PACMAN_SKY_COMFLAT_032_0003.fits
opdc.dlfeedback(1)=35.4058234339239e+000 (speed~-4.4e-3mm/sec)
- 49 PACMA.2011-02-01T04_38_25.916.fits <-> PACMAN_SKY_VLTIRESPONSE_032_0007.fits
opdc.dlfeedback(1)=35.0128623131204e+000
- 50 PACMA.2011-02-01T04_46_29.556.fits <-> PACMAN_SKY_VLTIRESPONSE_032_0008.fits
opdc.dlfeedback(1)=32.8888249123894e+000
- 51 PACMA.2011-02-01T04_51_53.216.fits <-> PACMAN_OBJ_ASTRO_032_0004.fits Jump DL4 tracking
(recording of 5min-> until ~04:57)
AminusB Jump at T₁=130.3s opdc.dlfeedback(1)= 30.9296576356385e+000
minusB Jump of 3.77 microns at T₂=133.6
07:01:55> PRI MET RESET1/2 DATANOTVALID1/2 Continously until 07:37
07:37:12> PRI MET RESET1/2

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Sequence on Feb1:

on HD101406 / HIP56910 without rereset:

```

70      PACMA.2011-02-01T06_04_04.871.fits <-> PACMAN_SKY_VLTIRESPONSE_032_0016.fits      DL4 tracking going down
      False jump detection
07:01:55> PRI MET RESET1/2 DATANOTVALID1/2 Continously until 07:37
77      PACMA.2011-02-01T07_04_43.416.fits <-> PACMAN_SKY_BACKGROUND_032_0008.fits
      AminusB: no jump
      MinusB T=4.94758 s, weird jump minusB ~ 1.3 to 1.5 microns (??? Very close to 1 λ) ; Nothing on minusB.status
      Logmonitor PRI MET DATANOTVALID1/2 = '12F dec2bin(hex2dec('12F'))=0100101111 (pll)
      opdc.dlfeedback(1)=34.6780476410758e+000
81      PACMA.2011-02-01T07_08_43.977.fits <-> PACMAN_SKY_VLTIRESPONSE_032_0018.fits
      opdc.dlfeedback(1)=33.5958850251379e+000
82      PACMA.2011-02-01T07_21_54.647.fits <-> PACMAN_SKY_VLTIRESPONSE_032_0019.fits      DL4 tracking
      AminusB jump at T=36.46s opdc.dlfeedback(T)= 29.8980158005736e+000
      minusB jump at T=39.53s
07:37:12> PRI MET RESET1/2
      Δdlfeedback= 4.78m

```

Sequence Feb2 without rereset

```

116     PACMA.2011-02-02T08_16_31.309.fits <-> PACMAN_SKY_VLTIRESPONSE_033_0027.fits      DL4 tracking going down
09:00:40 (LT=6:00)> PRI MET RESET1
132     PACMA.2011-02-02T09_01_26.647.fits <-> PACMAN_SKY_VLTIRESPONSE_033_0033.fits      DL4 tracking
      Opdc.dlfeedback(1)=29.81
136     PACMA.2011-02-02T09_16_01.256.fits <-> PACMAN_SKY_VLTIRESPONSE_033_0037.fits      DL4 tracking
      A minusB jump at T=126.2s opdc.dlfeedback(T)= 24.5209463362320e+000
      minusB jump at T=129.2s opdc.dlfeedback(T)
Logmonitor OK from last reset to:
09:35:32(LT=06:35)> PRI MET STOPMPO = 'IP1' ,2,3,4
      Δdlfeedback= 5.28m

```

Conclusion of the last 3 sequences

- No status error recorded in the file !! (only standard minusB:PM overflow), although the DATANOTVALID flag was logged frequently.
 - wrong event triggers DATANOTVALID ?
 - wrong status written on RMN ?
 - Phase meter mis-behavior ?
- After RESET1/2, the tracking DL4 moved by only 5.22 meters when the jump of AminusB=3.79microns occurred. This does not corresponds to a FCoverflow occurring after 11m of OPL.. This suggests that :
 - Either RESET1/2 is logged although, there were no reset
 - Or reset is not propagated to the phase meter (e.g. cable disconnected)
 - Or reset of the phase meter does not reset the FC counter
- Similar Jump on AminusB and minusB. The time difference (T2-T1~3 sec could well correspond to the time difference between the reset of the 2 phase meter (reset1 and reset2). However, this is not a problem for operation.
- An efficient Jump detection can be performed by looking at the acceleration signal (3.8microns with $f_s=4\text{kHz} \sim 60\text{m/s}^2$). For minusB, the acceleration due to PMoverflow $a=172\text{mm}^2/(\text{ts})^2=5.5\text{e6 m/s}^2$ for $f_s=1/\text{ts}=4\text{kHz}$

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Sequence on Feb4

HD66598 / HD66598B DLrepreset between files

Logmonitor: 02:15:50: RESET1/2

Then no RESET detected, NO DATANOTVALID1/2 reported during the whole set of files

```

32    PACMA.2011-02-04T02_34_37.029.fits <-> PACMAN_OBJ_ASTRO_035_0001.fits;          DL4-trak=65.9918201628837e+000
46    PACMA.2011-02-04T03_09_40.727.fits <-> PACMAN_SKY_VLTIRESPONSE_035_0009.fits DL4-trak =54.9283830485700e+000
61    PACMA.2011-02-04T03_51_11.444.fits <-> PACMAN_SKY_COMFLAT_035_0006.fits      DL4-trak =43.8644096619716e+000
75    PACMA.2011-02-04T04_30_15.343.fits <-> PACMAN_SKY_VLTIRESPONSE_035_0020.fits DL4-trak =32.7867553421659e+000
90    PACMA.2011-02-04T05_09_31.961.fits <-> PACMAN_SKY_VLTIRESPONSE_035_0027.fits DL4-trak =21.7365475465618e+000
    Δdlfeedback= 11m for each pair of files

```

Other target **GI570**

Logmonitor: 07:49:19: RESET1/2

```

122    PACMA.2011-02-04T08_01_06.361.fits <-> PACMAN_SKY_VLTIRESPONSE_035_0036.fits DL4-track=77.1176682371816e+000
131    PACMA.2011-02-04T08_36_39.720.fits <-> PACMAN_SKY_VLTIRESPONSE_035_0041.fits DL4-track=66.0658200804584e+000
    Δdlfeedback= 11m

```

10 CHECK THE LOG STATUS ON THE LOGMONITOR

```

07:01:53> PRI MET DATANOTVALID1 = '127 (GlitchPLL Locked 849142),0.07,0.59,0.03,0.17' / Phasemeter status2 validity flags failure. [lprmac]
07:01:53> PRI MET DATANOTVALID2 = '12B (GlitchPLL Locked 849037)' / Phasemeter status2 validity flags failure. [lprma2]
->Not same status value for same effect
>> dec2bin(hex2dec('127'))=0100100111 glitch: 650k Probe; pll
>> dec2bin(hex2dec('12b'))=0100101011(LSB) glitch: 450k Probe; pll

07:01:54> PRI MET DATANOTVALID1 = '133 (Glitch450k PROBE 30785),0.08,0.58,0.02,0.17' / Phasemeter status2 validity flags failure. [lprmac]
>> dec2bin(hex2dec('133'))=0100110011 450k Probe 650k Probe

07:01:55> PRI MET DATANOTVALID1 = '123 (GlitchPLL Locked 849293),0.06,0.58,0.02,0.16' / Phasemeter status2 validity flags failure. [lprmac]
    Now GlitchPLL reported as error 123
>> dec2bin(hex2dec('123'))=0100100011 450k Probe 650k Probe pll

07:02:14> PRI MET DATANOTVALID2 = '12B (GlitchPLL Locked 850723)' / Phasemeter status2 validity flags failure. [lprma2]
07:02:15> PRI MET DATANOTVALID1 = '12B (GlitchPLL Locked 850915),0.20,0.58,0.04,0.16' / Phasemeter status2 validity flags failure. [lprmac]
    Both phase meters reports now 12B for same error
>> dec2bin(hex2dec('12b'))=0100101011(LSB) glitch: 450k Probe; pll

```

Conclusion:

The Status error number reported on the logMonitor does not correspond to the description written on the logMonitor. Only 1 error type is reported even if multiple error type occurred

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11 POLARIZATION CROSS-TALK ON THE QUADCELLS

New preset:

DL2=86 m

DL4= 43 m going down

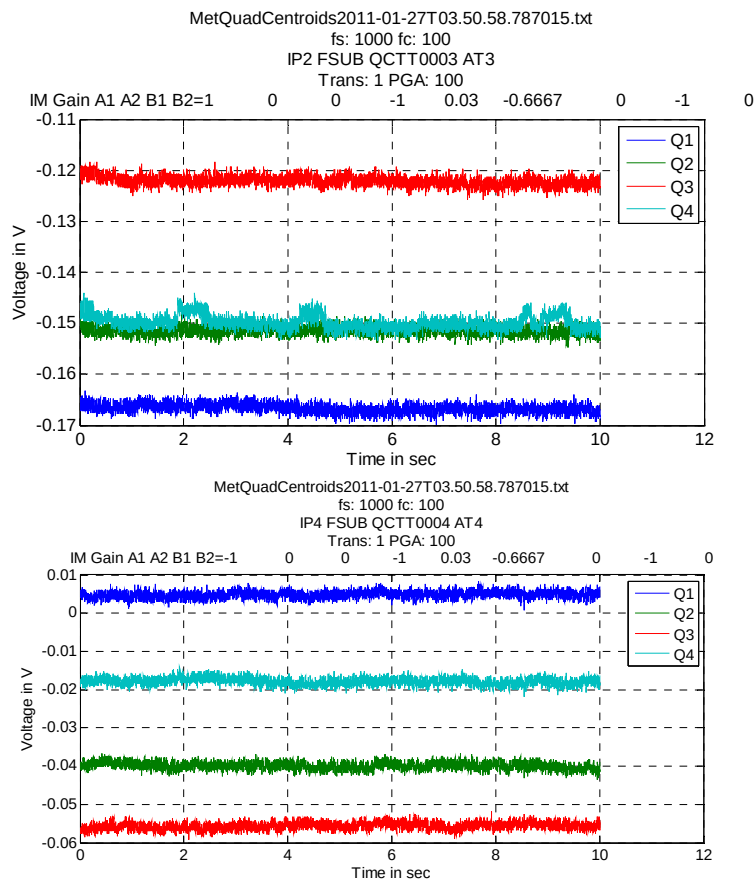
DDL1=15mm going up

(star separation: ~ 30 arcsec) $\rightarrow$ differential OPD $\sim 30 \times 5 \times 10^{-6} \times B = 100 = 15$ mm

take and use background on IP2 and IP4 (AOM are set to zero)

AOM_IP2=0; AOM_IP4=0

-rw-rw-rw- 1 vx vlt 2125262 Jan 27 03:51 MetQuadCentroids2011-01-27T03.50.58.787015.txt



Quad background IP2: Q1=-164mV Q2=-148mV Q3=-120mV Q4=-149mV

% IP2 Background -0.164 -0.148 -0.120 -0.149

Quad background IP4: 4.8mV -40mV -55mV -18mV

% IP4 Background 0.004 -0.042 -0.056 -0.018

The backgrounds are correctly computed in the file header

The offset voltages are valid for a given TRA/PGA gain combination (TRA=1 PGA=100 in this example)

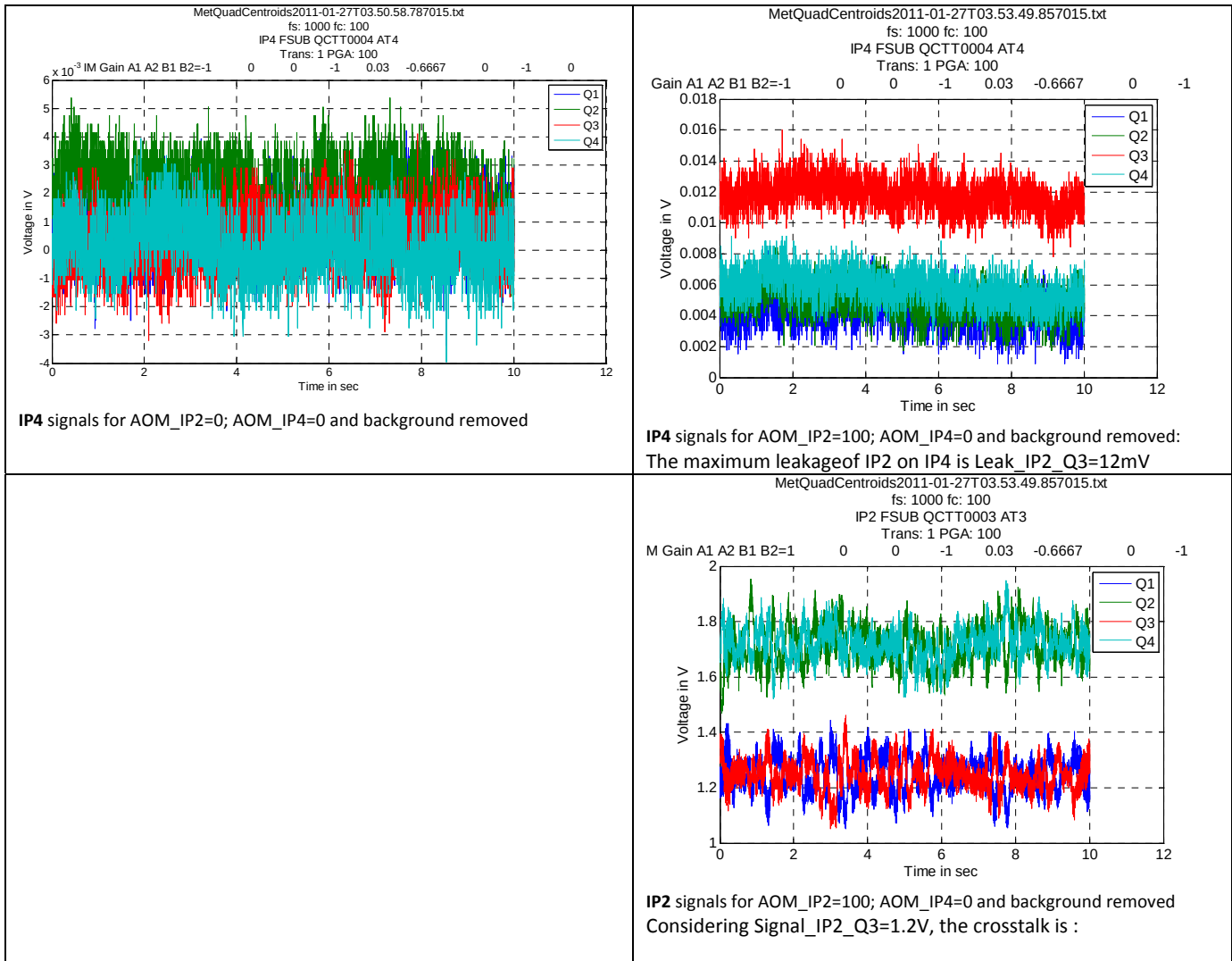
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11.1.1 PRIMET-B

AOM_IP2=100; AOM_IP4=0, Beam track on IP2

-rw-rw-rw- 1 vx vlt 114190 Jan 27 03:54 MetQuadCorrections2011? -01-27T03.53.49.857015.txt

-rw-rw-rw- 1 vx vlt 2050292 Jan 27 03:54 MetQuadCentroids2011? -01-27T03.53.49.857015.txt



→ Leak_IP2/Signal_IP2=1%

AOM_IP2=0; AOM_IP4=100, Beam track on IP4

-rw-rw-rw- 1 vx vlt 113831 Jan 27 03:56 MetQuadCorrections2011? -01-27T03.56.04.447015.txt

-rw-rw-rw- 1 vx vlt 2003035 Jan 27 03:56 MetQuadCentroids2011? -01-27T03.56.04.447015.txt

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Leakage Ip4 on IP2

Mean Q1 = -2.560815e-003 V

Mean Q2 = -5.470345e-003 V

Mean Q3 = -2.046086e-003 V

Mean Q4 = -1.777191e-003 V

Signal on IP4 ~ 2.2 V

→ $\text{Leak_IP4}/\text{Signal_IP4} \sim 5\text{e-}3/2.2 = 0.2\%$

11.1.2 PRIMET-A

AOM_IP1=0; AOM_IP3=0

-rw-rw-rw- 1 vx vlt 126980 Jan 27 03:59 MetQuadCorrections2011? -01-27T03.59.09.487015.txt

-rw-rw-rw- 1 vx vlt 2118200 Jan 27 03:59 MetQuadCentroids2011? -01-27T03.59.09.487015.txt

TRA=1 PGA=10 for IP1 and IP3

file header

% IP3 Background -0.005 0.007 0.008 0.000

% IP1 Background -0.015 -0.010 -0.011 -0.004

→ Ok the backgrounds are correctly computed

AOM_IP1=100; AOM_IP3=0, Beam track on IP1

-rw-rw-rw- 1 vx vlt 146744 Jan 27 04:01 MetQuadCorrections2011? -01-27T04.00.49.367015.txt

-rw-rw-rw- 1 vx vlt 2036847 Jan 27 04:01 MetQuadCentroids2011? -01-27T04.00.49.367015.txt

Leakage Ip1 on IP3 ~ 3mV

signal Ip1 ~ 0.8V (min)

→ $\text{Leak_IP1}/\text{Signal_IP1} \sim 3\text{e-}3/0.8 = 0.4\%$

AOM_IP1=0; AOM_IP3=100, Beam track on IP3

-rw-rw-rw- 1 vx vlt 1993688 Jan 27 04:03 MetQuadCentroids2011? -01-27T04.02.59.307019.txt

-rw-rw-rw- 1 vx vlt 144373 Jan 27 04:03 MetQuadCorrections2011? -01-27T04.02.59.307019.txt

Leakage Ip3 on IP1: Q1=14mV Q2=34mV Q3=11mV Q4=8mV

signal Ip3 ~ Q1=0.95 V Q2= 1.46 V Q3=0.96V Q4=1.46 V

1.5 % 2.4% 1.14% 0.5%

→ $\text{Leak_IP3}/\text{Signal_IP3} \sim 3\text{e-}3/0.8 = 0.5\%-2.4\%$

To be quantified:

Tracking point offset to due leakage

Procedure:

- o AOM_IPX=100; AOM_IP(X+2)=100
- o STRTMPO IPX and IP(X+2) STRTENG
- o STOPMPO IP(X+2) (to avoid that the beam is dragged away after SETAOM=0)
- o SETAOM_IP(X+2)=0
- o STOPENG and check for beam displacement "Peak" (and associated beam correction peak" on IPX. Compare to close loop residuals

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12 TEST OF THE IMPACT OF THE ST DEROTATOR SPEED ON THE PUPIL TRACKING

estimation of the speed used during the swap: 180deg in ~ 20 sec--> speed=9 deg/sec

stop telescope tracking
stop DL/DDI tracking

-> see only the effect of derotator induced vibrations on
IP3 (AT4-A) and IP4 (AT4-B)

File 1-->speed=1

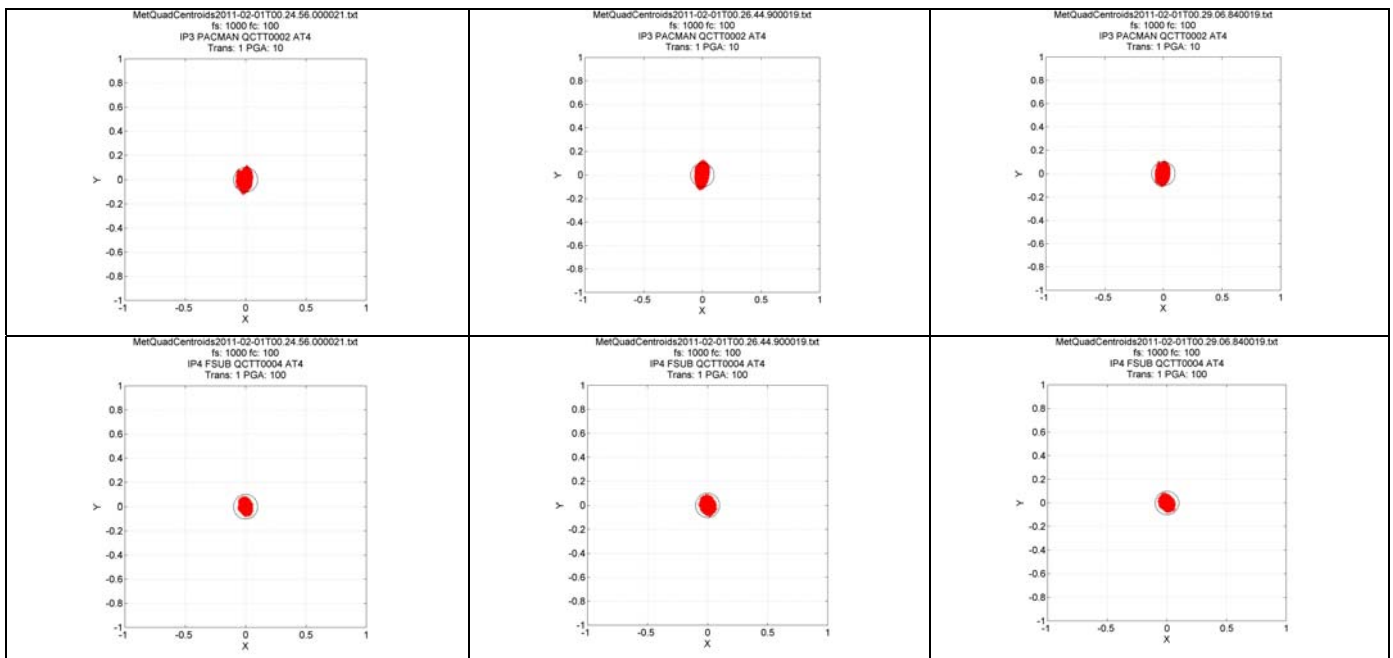
-rw-rw-rw- 1 vx vlt 11523520 Feb 1 00:26 MetQuadCentroids2011? -02-01T00.24.56.000021.txt
-rw-rw-rw- 1 vx vlt 1036997 Feb 1 00:26 MetQuadCorrections2011? -02-01T00.24.56.000021.txt

File 2--> speed=1 and after 3sec speed =5 (which is the swap speed~90deg in ~20sec)

-rw-rw-rw- 1 vx vlt 11525994 Feb 1 00:29 MetQuadCentroids2011? -02-01T00.26.44.900019.txt
-rw-rw-rw- 1 vx vlt 1036471 Feb 1 00:29 MetQuadCorrections2011? -02-01T00.26.44.900019.txt

File 3--> speed=0 and after 3sec speed =10

-rw-rw-rw- 1 vx vlt 11531000 Feb 1 00:30 MetQuadCentroids2011? -02-01T00.29.06.840019.txt
-rw-rw-rw- 1 vx vlt 1035065 Feb 1 00:30 MetQuadCorrections2011? -02-01T00.29.06.840019.txt



Conclusion:

- ➔ IP4 always in specs
- ➔ IP3 slightly out of spec
- ➔ no significant influence of the derotator speed.

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13 FUNCTIONAL TEST OF THE PRIMET HEALTH CHECK WITH THE PACMAN OB: PACMAN_TEC_METHEALTH

UT=0:01:51 (LT=9h00)
RA_P=034740 (=sidereal time)
RA_S=034742
DEC (P&S)=-200000

DDL1=10mm
DL2=98m
DL4=28m

DDL :speed=3000 (mech) acceleration=10000 (mech)
DL: Speed 0.005 (mech) Acceleration 0.18 (mech)

: whole sequence

-rw-rw-r-- 1 pacman vlt 48153600 Feb 1 00:12 PACMAN_TEC_METHEALTH_032_0004.fits
-rw-rw-r-- 1 pacman vlt 47586240 Feb 1 00:15 PACMAN_TEC_METHEALTH_032_0005.fits
-rw-rw-r-- 1 pacman vlt 47586240 Feb 1 00:16 PACMAN_TEC_METHEALTH_032_0006.fits

only swap/unswap

-rw-rw-r-- 1 pacman vlt 70718400 Feb 1 00:18 PACMAN_TEC_METHEALTH_032_0007.fits

whole sequence

-rw-rw-r-- 1 pacman vlt 47586240 Feb 1 00:41 PACMAN_TEC_METHEALTH_032_0008.fits
-rw-rw-r-- 1 pacman vlt 47586240 Feb 1 00:43 PACMAN_TEC_METHEALTH_032_0009.fits
-rw-rw-r-- 1 pacman vlt 70680960 Feb 1 00:45 PACMAN_TEC_METHEALTH_032_0010.fits

Conclusion:

- the script is working well.
- Warning: During COM14, one cannot compare directly DDLfeedback and primet A-B because DDL feedback gives the position of 1 DDL only (but not the same DDL before and after the swap !)
- The results show that because of the rate/acceleration limits, the (d)OPDc commands and the resulting physical motion of the DL/DDL may not match. One cannot rely only on the (d)OPDc commands for automatic fringe search during simple scans.

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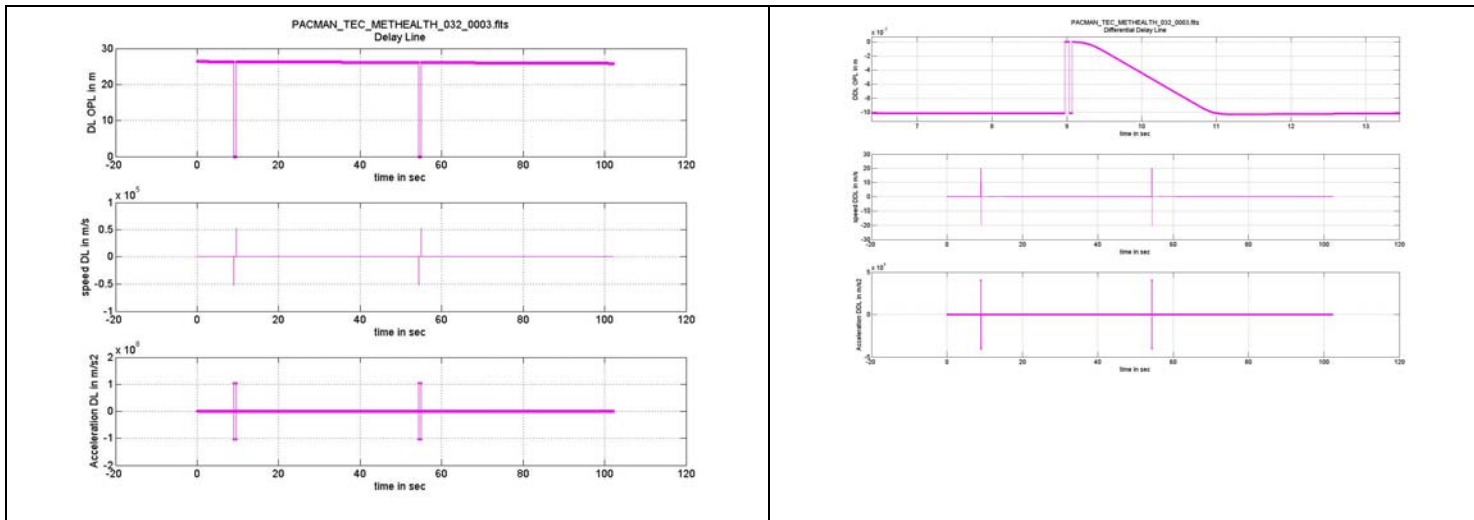


Figure 2: DDL feedback signals during a swap/unswap (the tracking DDL signals are merge into the same pacman file)

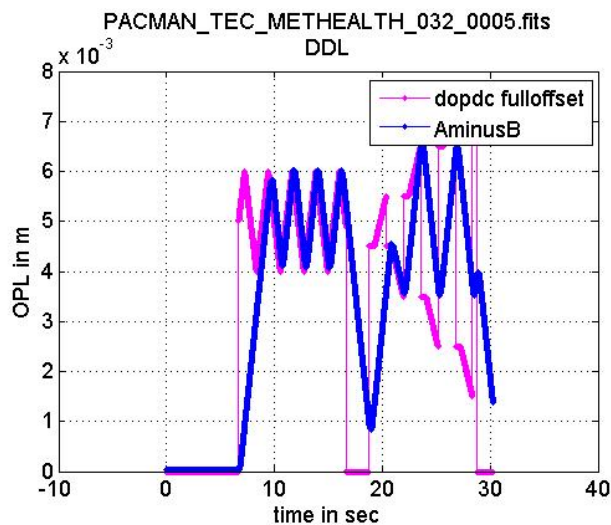
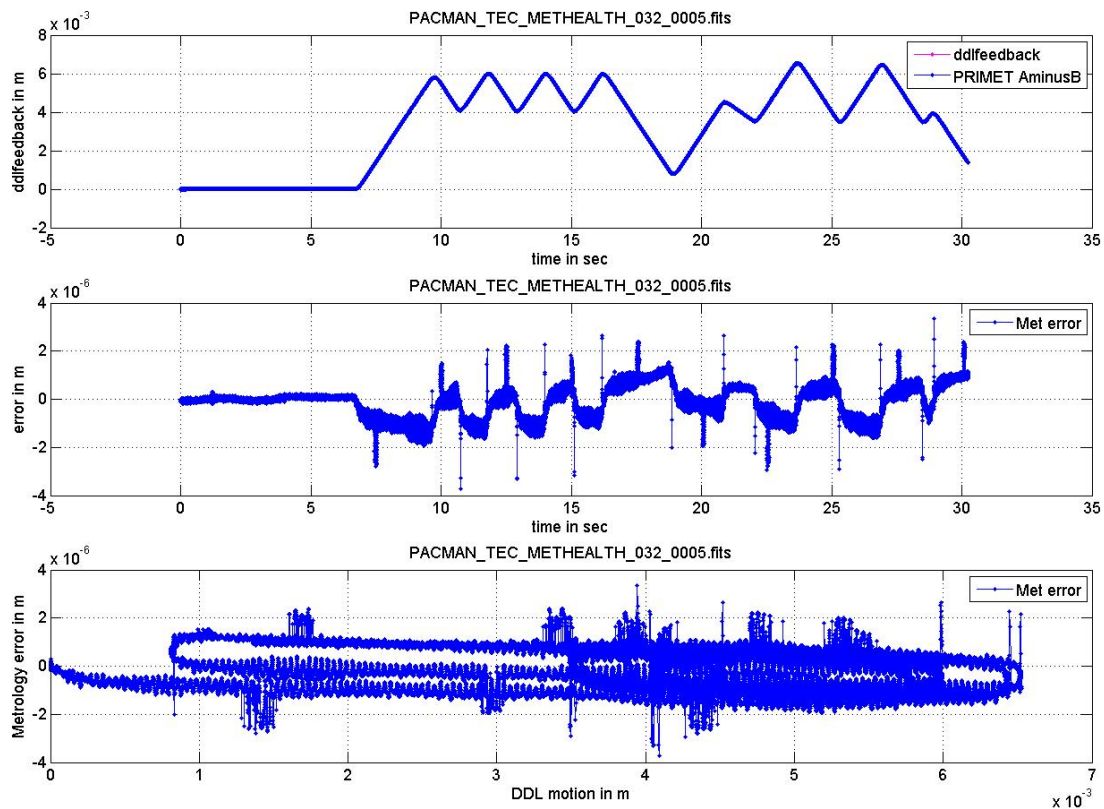


Figure 3: Mismatch between the dopdc commands and the physical motion of the DDL due to the DDL rate/acceleration limits.

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Worst case linear error $\sim 2 \times 10^{-6} \text{m} / 6 \text{mm} = 330 \text{microns/m}$

Error with fixed DDL $\sim 200 \text{nm PV}$

With moving DDL: Cyclic error $\sim 600 \text{nm}$ at $\sim 50 \text{ Hz}$ or Cyclic error $\sim 600 \text{nm}$ every 33mm. To be investigated

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14 PRIMET SCRIPTS

14.1 Osf Scripts on wprima

14.1.1 priosfPRIMET_ONLINE

Objective: set PRIMET all LCU's ONLINE and check Interlock

Preconditions: none

Steps:

- software configuration
 - a. (get date,time,module version)
 - b. Check PRIMET modules Ignored status
- PRICS start
 - a. Check that the PRIMET LCU's are alive
 - b. Restart PMCS, activate the PLC monitoring (interlock)
- Command ONLINE PRIMET LCU's and PMCS
- Check Laser Interlock Status

Postconditions:

all PRIMET LCU's are Online

Attention: this does not yet mean that PRIMET can be operated! The mirror configuration is not not set !

14.1.2 priosfPRIMET_PREPARE_LABCAL

Objective: set PRIMET for FSU lab calibration

Preconditions: Interlock armed after the inspection of the Laser Controlled Areas (in coordination with the VLT manager)

Steps:

- software configuration
 - a. (get date,time,module version)
 - b. confirm ARAL status by Operator
 - c. Check PRIMET modules Ignored status
- PRICS start
 - a. Check that the PRIMET LCU's are alive
 - b. Restart PMCS, activate the PLC monitoring (interlock)
- Command ONLINE PRIMET LCU's and PMCS
- Configuration
 - a. Move Flip OD to Marcel Position
 - b. Set the sampling rate of both phasemeters to 4 kHz
- Start Laser
 - a. Check laser interlock status
 - b. Request the operator to confirm if the laser can be switched ON
 - c. Request the operator to Confirm the Laser Stabilization Precision (LSP)
 - d. Close the frequency stabilization loop and verify the stability according to the LSP
- Preset the FSUB and FSUA ACU to online, AUTOTEST
- Start metrology measurements (STRTMET)

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- SET the state of PMCS to ONLINE-STABLE-NotGuiding-Recording

Postconditions:

- PMCS is in state ONLINE-STABLE-NotGuiding-Recording
- PRIMET is ready for lab calibration

[It is recommended to use this script even if a calibration is done at the end of the night after having used the metrology on sky. It is not compulsory but safer, just in case for example if the PRIMET sampling frequency has changed or after any weird manual configuration of PRIMET during the night for engineering tests]

14.1.3 priosfPRIMET_TEST_ON_MARCEL

Objective: Engineering test of PRIMET using Marcel involving pmlss, pmacq, pmcs (but no pmpsd)
The LMOT translation stages of the FSUs are moved (square wave) and engineering files are taken. The operator checks that PRIMET sees correctly the LMOT motion.

Preconditions:

- Interlock armed after the inspection of the Laser Controlled Areas (in coordination with the VLTI manager)
- Marcel bs mirrors set in AUTOTEST [human intervention using waral/aripanControl]

Steps:

1. do all steps of priosfPRIMET_PREPARE_LABCAL
2. Verify metrology Signals
 - o Request the operator to select the input beam (IP), duration, amplitude and if the laser must be switched off after the completion of the test
 - o Start plotting the PRIMET measurements
 - o Move the FSU LMOTs (square wave with the parameters defined by the operator)
 - o Request the operator to confirm if the LMOT motion are correctly detected by PRIMET
3. Record PRIMET engineering files on lprmac/lprma2. The files are located on wprima under /vltdata/ENVIRONMENTS/lprmac and /vltdata/ENVIRONMENTS/lprma2
4. stopmet

14.1.4 priosfPRIMET_START

Objective: safely start-up PRIMET for night observation

Preconditions: Interlock armed after the inspection of the Laser Controlled Areas (in coordination with the VLTI manager)

Steps:

- software configuration
 - a. (get date,time,module version)
 - b. Reset PRIMET modules ignored status (priguistatus)
 - c. Close all PRIMA Gui's
- PRICS start
 - a. Check that the PRIMET LCU's are alive

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- b. Restart PMCS, activate the PLC monitoring (interlock)
- Command ONLINE PRIMET LCU's and PMCS
- Configuration
 - a. Configure PRIMET instrument to PACMAN
 - b. Configure PRIMET telescopes
 - c. Check dedicated LAN to STS-VCM LCUs
 - d. Move Flip OD to "sky" Position
 - e. Set the sampling rate of both phasemeters to 4 kHz
- Start Laser
 - a. Check laser interlock status
 - b. Request the operator to confirm if the laser can be switched ON
 - c. Request the operator to Confirm the Laser Stabilization Precision (LSP)
 - d. Close the frequency stabilization loop and verify the stability according to the LSP

Postconditions:

PMCS in state ONLINE-STABLE

(we don't go further, no attempt to close the pupil tracking loop or STRTMET because we don't know if the STS-fsm/VCM and VLTi configuration is set properly)

14.1.5 priosfPRIMET_STOP

Objective: safely terminate the use of PRIMET

Preconditions: PRIMET in any configuration

Steps

- STOPMET
- STOPMPO ALL
- STOP Laser frequency stabilization
- Switch laser Standby
- Disarm Interlock
- put all primet processes Standby (pmcs, pmlss,pmppsd,pmacq)
- kill all PRIMET panels

Postconditions:

All PRIMET sub-systems and pmcs in Standby

Laser OFF and interlock disarmed.

14.2 Osf Scripts on watXtcs

Objective: prepare the STS-FSM and VCM for PRIMET day-time engineering tests without having to do an AT startup and a preset

Preconditions: none

Steps:

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- Set the STS-VCM and the STS-FSM online
- Position FSM's away from M10 edge
FSM Beam_A alignment offset +200
FSM Beam_B alignment offset -200

Postconditions:

The STS is ready for PRIMET engineering tests

14.3 Scripts running on PACMAN (Health check)

Objectives and main description

- Check and characterize the behavior/health of PRIMET in conditions representative of a PRIMA observation.
- PRIMET is operated up to the 2xAT-STs, through the laboratory optical path (including the FSU ACU's), the DDL and DL. Various PRIMA operational transitions are exercised to check the metrology robustness.

Preconditions:

- Interlock armed after the inspection of the Laser Controlled Areas (in coordination with the VLT manager)
- The hardware configuration of the Array is PRIMA compatible (i.e. AT->STS, M12-DL)

Sequence

1/ Configuration (to be done by the operator)

- Run the "VLT start-up" in the PRIMA mode: DLCS, ARAL, ATCS, FSU, DDL, PRIMET, VLT supervisor
- The AT enclosures remain closed if the tests are run during day-time
- Check that the ISS Observer State is ONLINE (issguiObsStatus on wvgvlti); unignore all modules
- Configure the ARRAY (issguiConfig on wvgvlti) for PRIMA
 - o (ISS) ARRAY CONFIGURATION: Expert Mode->feed Mode=PRIMA_DUAL-> Configure proper PRIMA config (AT3-STs, AT4-STs, input 1,3, Comp diff)
- Configure the LAB (issguiObsMain on wvgvlti)
 - o ISS Observer Main : lab-> Mirror Configuration=PACMAN (no switchyard config) ->Configure

2/ PRESET sequence (the whole VLT can be preset during day-time with the enclosure closed)

- pssguiSetup on wvgvlti
 - o Example of Coordinates
 - Primary Star: RA=current Sidereal time (e.g. 034740) and DEC=-200000 (~close to zenith)
 - Secondary Star: RA= RA_primay +5sec (e.g 034745) and DEC=DEC_primary
 - o Guiding/Chopping: no entry
 - o Delay Line: Select reference DL (e.g. DL2); Reference OPL=0m; sensor=FSUB; Mode=Auto
 - o Differential Delay Line: default sensor=FSUA; swap sensor=FSUB
 - o Fringe sensor Unit: no entry

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- o CLRSTP and PRESET: the AT, DL and DDL are now blind tracking
- o Check that the DL remaining tracking time is enough, if not repret the DL
 - from dlguiUser &: STOPTRK, increase the Min Trk Time, and preset DL to current

3/ Test sequence and Data Recording

- Preconditions: PRESET sequence completed
- Start the PRIMET measurement display from pmacgui (both for PRIMETA-B and PRIMET-B)
- wpacman (user pacman)-> run Bob-> then load "PACMAN_TEC_METHEALTH". This script runs:
 1. STRTMPO (close PRIMET pupil tracking), STOPMET (just to set the initial conditions) and STRTMET (start recording)
 2. an OPDc "simple scan" and a " fringe tracking (group delay)" (=fringe search).
(this sequence is recorded in PACMAN_TEC_METHEALTH_XXX_YYYY.fits under /rmnrec)
 3. a dOPDc "simple scan" and a " fringe tracking (group delay)" (=fringe search)
(this sequence is recorded in PACMAN_TEC_METHEALTH_XXX_YYY(Y+1).fits)
 4. SWAP and UNSWAP
(this sequence is recorded in PACMAN_TEC_METHEALTH_XXX_YYY(Y+2).fits)
 5. STOP RECORDING
 6. STOPMET

Note:

- The parameters of the opdc, dopc and of the swap/unswap sequences can be defined as shown below
- Each of the 3 these sequences (steps 2,3,4) can be skipped from Bob. The corresponding file will not be created.
- During the execution of the script, the user can cross-check that the measurements displayed by PRIMET corresponds to the trajectory defined by the parameters of steps 2,3,4 and that PRIMET does not glitch

4/ Stop the observation and if need be go to standby by running the VLT shut-down script

5/ look at the files (an online matlab script running on pacman will be provided in the future)

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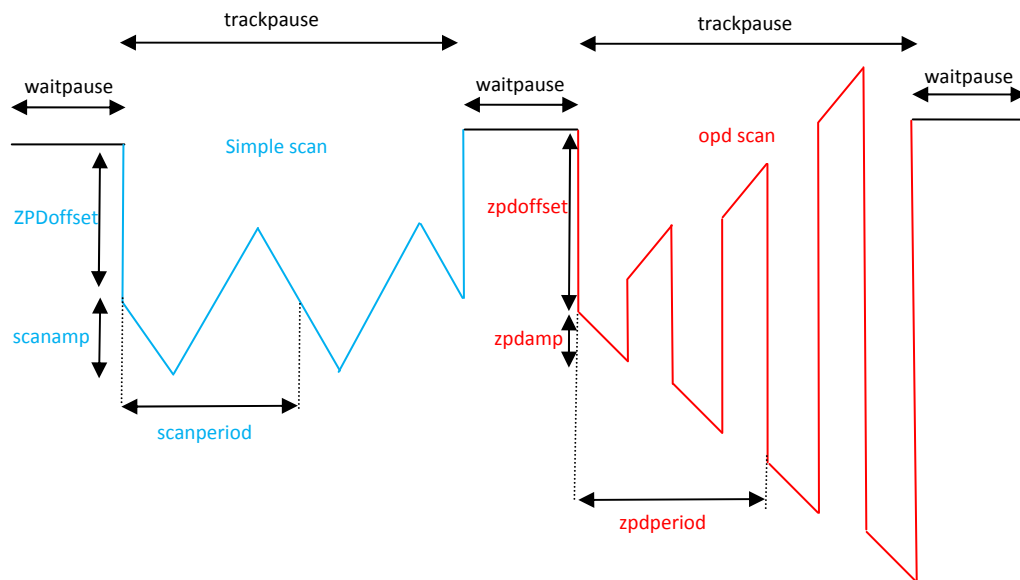


Figure 4: parameters of the simple scan and opd scan used in PACMAN_TEC_METHEALTH. The same definition applies both for OPDc (using the tracking DL) and dOPDc (using the tracking DDL).

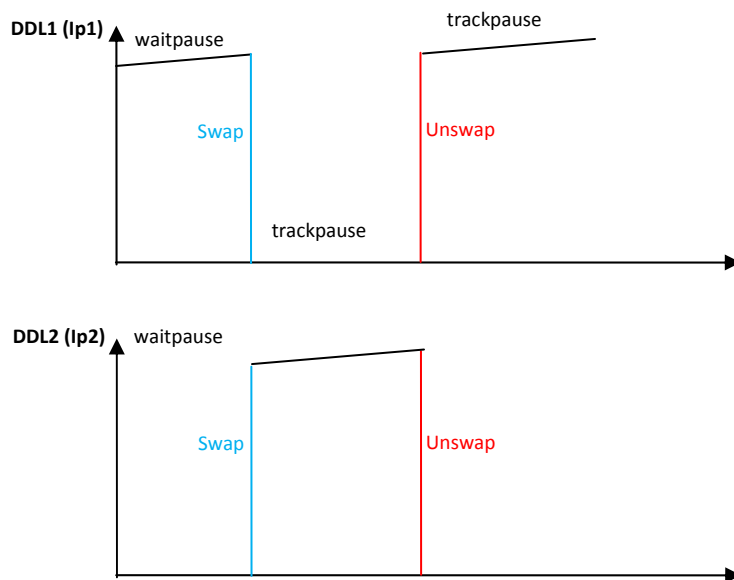


Figure 5: parameters for the swap/unswap sequences. During both sequences DDL3 (IP3) and DDL4(ip4) remains at zero.

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Example of typical Parameters

DL * ZPDOffset=10mm * Scan Amplitude=1mm=ZPDamp * Scan Period=0.5 * ZPD PErIOD=Scan Period/2=0.25 * TrackPause =5sec (>4.scan period to see 2 ZPD serach period) * waitpause=2sec	DDL * ZPDOffset=5mm * Scan Amplitude=1mm=ZPDamp * Scan Period=2.2 * ZPD PErIOD=Scan Period/2=1.1 * TrackPause=10sec (>4.scan period to see 2 ZPD serach period) * waitpause=2sec
---	--

# TPL edited by BOB TPL.ID "PACMAN_tec_ScanTrack" TPL.NAME " OPDC Scan ZPD " TPL.NEXP "1" TPL.MODE "OBSERVATION" SEQ.SCANTRK.CHANNEL "1" SEQ.SCANTRK.CLOSELEV "1001" SEQ.SCANTRK.DETLEV "1000" SEQ.SCANTRK.OPENLEV "1002" SEQ.SCANTRK.SCANAMP "1e-3" SEQ.SCANTRK.SCANPERIOD "0.5" SEQ.SCANTRK.SIGN "1" SEQ.SCANTRK.STOPMETRO "F" SEQ.SCANTRK.STRTMETRO "T" SEQ.SCANTRK.TRACKPAUSE "5" SEQ.SCANTRK.WAITPAUSE "2" SEQ.SCANTRK.ZPDAMP "1e-3" SEQ.SCANTRK.ZPD OFF "10e-3" SEQ.SCANTRK.ZPDPERIOD "0.25"	# TPL edited by BOB TPL.ID "PACMAN_tec_ScanTrack" TPL.NAME " DOPDC Scan ZPD " TPL.NEXP "1" TPL.MODE "OBSERVATION" SEQ.SCANTRK.CHANNEL "2" SEQ.SCANTRK.CLOSELEV "1001" SEQ.SCANTRK.DETLEV "1000" SEQ.SCANTRK.OPENLEV "1002" SEQ.SCANTRK.SCANAMP "1e-3" SEQ.SCANTRK.SCANPERIOD "2.2" SEQ.SCANTRK.SIGN "1" SEQ.SCANTRK.STOPMETRO "F" SEQ.SCANTRK.STRTMETRO "F" SEQ.SCANTRK.TRACKPAUSE "10" SEQ.SCANTRK.WAITPAUSE "2" SEQ.SCANTRK.ZPDAMP "1e-3" SEQ.SCANTRK.ZPD OFF "5e-3" SEQ.SCANTRK.ZPDPERIOD "1.1"	# TPL edited by BOB TPL.ID "PACMAN_tec_ScanTrack" TPL.NAME " DO SWAP UNSWAP " TPL.NEXP "1" TPL.MODE "OBSERVATION" SEQ.SCANTRK.CHANNEL "3" SEQ.SCANTRK.CLOSELEV "0" SEQ.SCANTRK.DETLEV "0" SEQ.SCANTRK.OPENLEV "0" SEQ.SCANTRK.SCANAMP "0" SEQ.SCANTRK.SCANPERIOD "0" SEQ.SCANTRK.SIGN "0" SEQ.SCANTRK.STOPMETRO "T" SEQ.SCANTRK.STRTMETRO "F" SEQ.SCANTRK.TRACKPAUSE "10" SEQ.SCANTRK.WAITPAUSE "2" SEQ.SCANTRK.ZPDAMP "0" SEQ.SCANTRK.ZPD OFF "0" SEQ.SCANTRK.ZPDPERIOD "0"
--	--	---

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15 APPENDIX

15.1 Configuration

AT3-G2-DL2-IP1: OPL0=97m

AT4-J2-DL4-IP3: OPL0=158m

Orientation ~ almost East-West

B(G2-J2)= 91.83~100m

Observation at Zenith-> DL2 OPL must be increased

- Example for DL4~20m for enough tracking time, DL2 must be put at OPL=81m !

File
Std. Options
Help

VLTi Arm Configuration Test Panel

Feeding Mode
Telescope
ROS
Location
PhysDL
Input
1. Switchyard
2. Switchyard

PRIMA_DUAL
AT3
STS
G2
DL2
1
comp. diff.
comp. diff.
TESTCONF

Num	Feed Mode	Telescope ...	ROS type	Location	Phys Delay ...	Input Chan...	Sw Yard Co...	Sec Sw Yar...	OPL Zero	Pupil In Zero	Pupil Out Zero
1	PRIMA_DUAL	AT3	STS	G2	DL2	1	comp. diff.	comp. diff.	97.2393	9.007	7.452
2	PRIMA_DUAL	AT4	STS	J2	DL4	3	comp. diff.	comp. diff.	158.1483	74.066	15.045
3	-	-	-	-	-	0	-	-	0	0	0
4	-	-	-	-	-	0	-	-	0	0	0
5	-	-	-	-	-	0	-	-	0	0	0
6	-	-	-	-	-	0	-	-	0	0	0
7	-	-	-	-	-	0	-	-	0	0	0
8	-	-	-	-	-	0	-	-	0	0	0
9	-	-	-	-	-	0	-	-	0	0	0
10	-	-	-	-	-	0	-	-	0	0	0

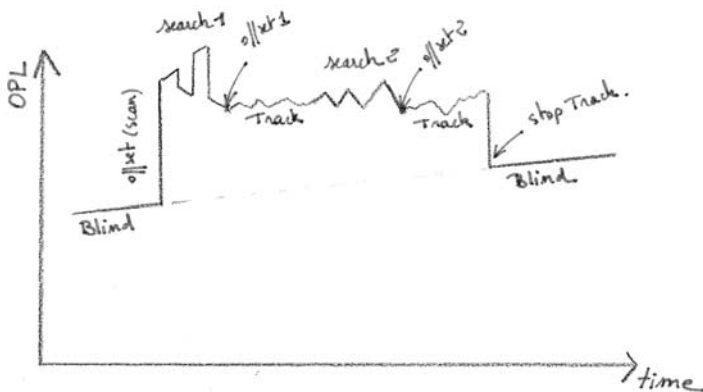
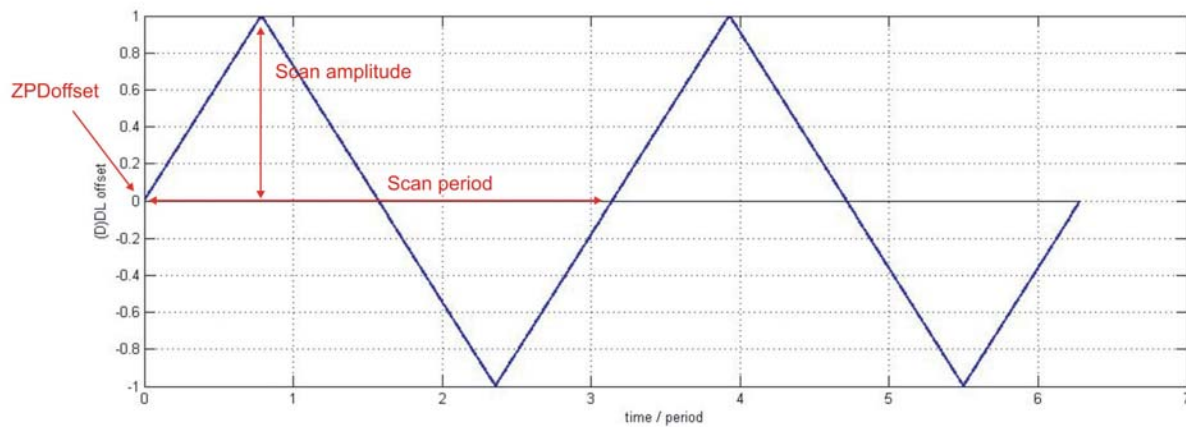
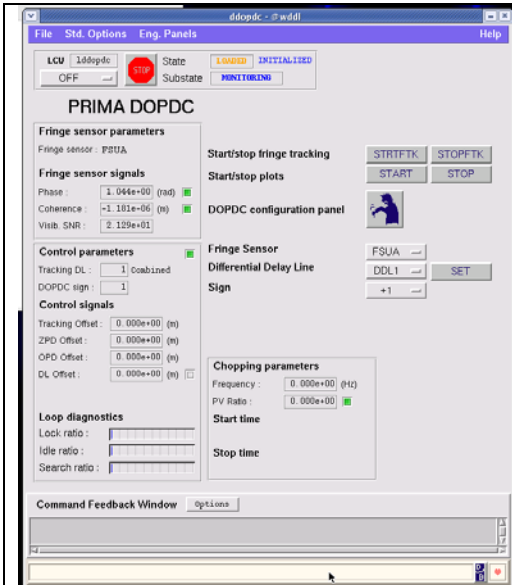
Clear Table

Command Feedback Window
Options

10:40:21 TSTCONF > REPLY/ L 158.1483,74.066,15.045
10:40:33 TSTCONF > INVOKED
10:40:33 TSTCONF > REPLY/ L 97.2393,9.007,7.452

Test Configuration Table

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15.2 Useful numbers and conversion factor

1 arcsec_sky=250microrad ACU

1 pix IRIS ~ 36 microrad ACU

0.45 micron_piezo_fsm=1 arcsec_sky=20units [Alignment offset]

Maximum OPL speed of DL and DDL ($v_{OPLmax} = \lambda \Delta v / 2$)

DL

Specs: 450,650kHz $\pm$ 55kHz leading to $v_{OPLmax} = \pm 36$ mm/s

As built: 450,650kHz $\pm$ 75kHz leading to $v_{OPLmax} = \pm 49$ mm/s,

DDL

Specs: 200kHz $\pm$ 27.5kHz , leading to $v_{OPLmax} = \pm 18$ mm/s

As built: 200kHz $\pm$ 34.5kHz, leading to $v_{OPLmax} = \pm 23$ mm/s

During COM14: Universal Time=Local Time+3hours

__oOo__