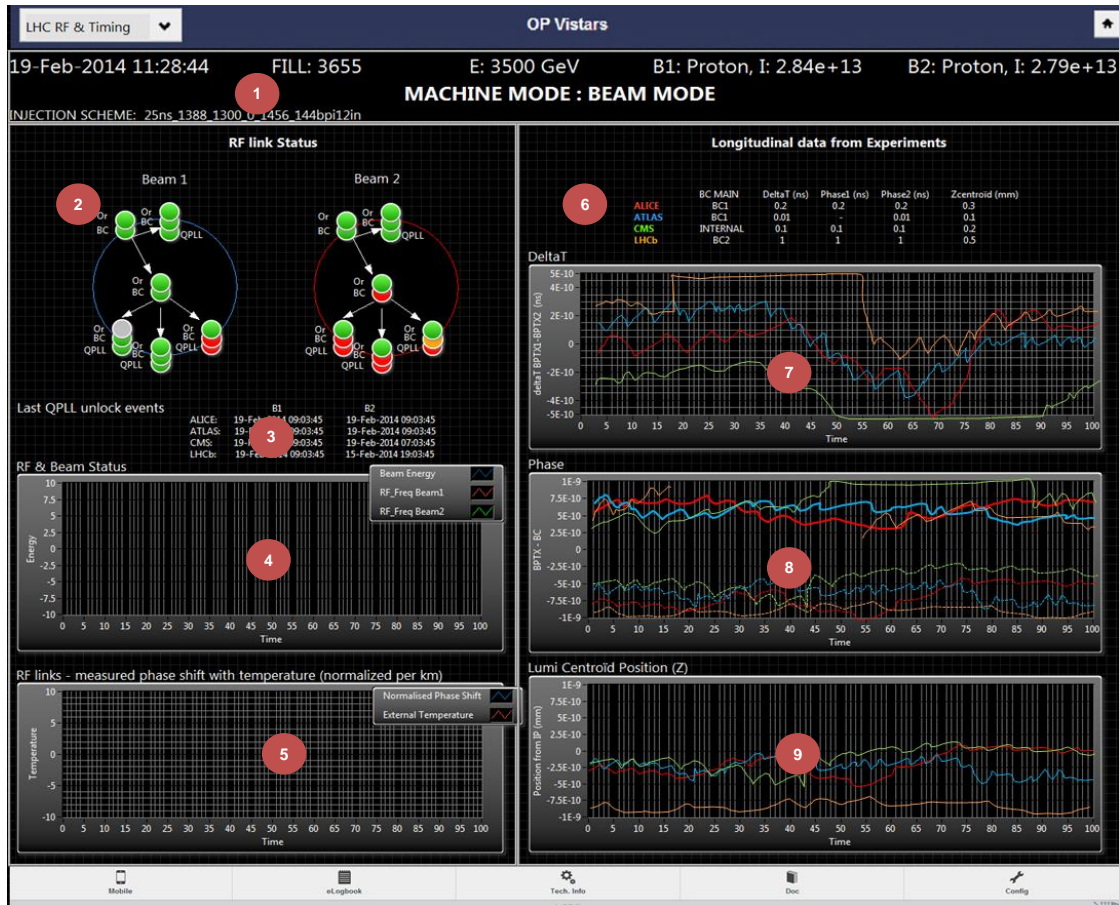


LHC Timing Fixed Display - v1.3

Description of the new "LHC RF Timing" Vistar.

Overview



New in V1.3:

- Table 2: Types added
- Table 6: Phase shift type and unit changed: now float in ns (for consistency with the rest of the page)

New in V1.2:

- Page3: BCx_QPLL_Timestamp type Time in seconds (unsigned int)
- Page4: Frequencies published by ATLAS were mixing publication name & value name (now, 1 publication per frequency: dip/ATLAS/LHC/Timing/**FreqBCx/Freq**). The type has been modified and is now "double".

New in V1.1:

- Page 2: the DIP publication quality can also be 'black', meaning: 'Not Available'
- Page2: labels of the Or and BC parameters changed to POr and PBC
- Refresh rates reduced on all tables.
- Page5: source of the RF_freq changed to: dip/ATLAS/LHC/Timing/FreqBC1* . Range changed (divided by 10 and adjusted)
- Notes pages 5, 6, 7 (yellow)
- Label of BCmain: LOCAL instead of INTERNAL

Header

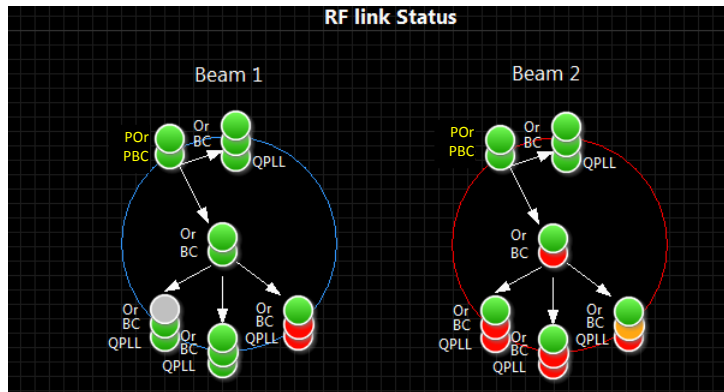
1 General usual data (date, time, fill #, energy, filling scheme, current beam mode)

1 19-Feb-2014 11:28:44
 2 FILL: 3655
 3 E: 3500 GeV
 4 B1: Proton, I: 2.84e+13
 5 B2: Proton, I: 2.79e+13
MACHINE MODE : BEAM MODE
10 INJECTION SCHEME: 75ns 1388 1300 0 1456 144bpl12in

Ref	Source (dip_path/PublicationName/ValueName)	type	Refresh rate
1	Date/time		Hz
2	Dip/acc/LHC/RunControl/RunConfiguration/FILL_NO	String	On change
3	Dip/acc/LHC/RunControl/RunConfiguration/TARGET_ENERGY	String	On change
4	Dip/acc/LHC/RunControl/RunConfiguration/PARTICLE_TYPE_B1	String	On change
5	Dip/acc/LHC/Beam/Intensity/Beam1/Value	String	On change
6	Dip/acc/LHC/RunControl/RunConfiguration/PARTICLE_TYPE_B2	String	On change
7	Dip/acc/LHC/Beam/Intensity/Beam2/Value	String	On change
8	Dip/acc/LHC/RunControl/MachineMode/Value	String	On change
9	Dip/acc/LHC/RunControl/BeamMode/Value	String	On change
10	Dip/acc/LHC/RunControl/RunConfiguration/ACTIVE_INJECTION_SCHEME	String	On change

RF link Status

2 Timing signal status over the TTC backbone



Parameter Names (beam x):

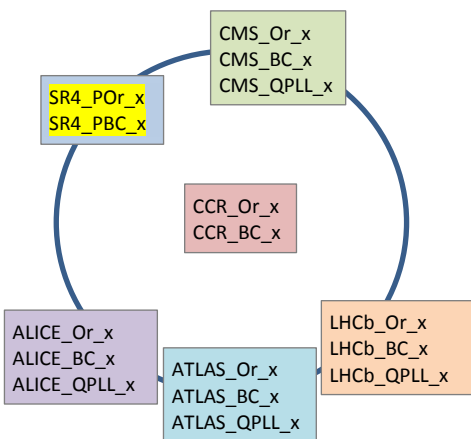


Table 1: color code wrt DIP publication status & value

	DIP Publication Quality		DIP Publication Timestamp		Published Data
●	good	&	changed between the 2 last publications	&	within the GREEN range (defined below)
●	good	&	changed between the 2 last publications	&	within the ORANGE range (if defined)
●	good	&	changed between the 2 last publications	&	within the RED range (defined below)
●	NOT GOOD	Or	Did not change	x	x
●	NOT AVAILABLE	x	x	x	x

Table 2: color code for each data type

Published Data Type	●	●	●	Type	Units
Power	X > 171	X ∈ [150;171]	X < 150	Int	none
Bunch Clock	X ∈ [40114.0 ; 40056.7]	-	X ∉ [40114.0 ; 40056.7]	Float	kHz
Orbit	X ∈ [11.245 ; 11.246]	-	X ∉ [11.245 ; 11.246]	Float	kHz
QPLL	1	-	0	boolean	

Table 3: parameter table for field 2

Ref	Source (dip_path/PublicationName/ValueName)	description	data type for color coding	Refresh rate
SR4_PO_r_x	dip/acc/LHC/Timing/TxFrevPower/SR4_Bx/POWER_FREV_Bx	Optical power of the transceiver of the Revolution Frequency (Orbit) for beam x	Power	0.2Hz
SR4_PBC_x	dip/acc/LHC/Timing/TxClocksPower/SR4_B1B2/POWER_B1	Optical power of the transceiver of the Bunch Clock for beam x	Power	0.2Hz
CCR_Or_x	Ax={dip/acc/LHC/Timing/RxFREV/FREV_Bx} and Bx={dip/acc/LHC/Timing/TxFrevPower/CCR_Bx/POWER_FREV_Bx}	Revolution Frequency status at the CCR: signal frequency received from the SR4 and power of the transmitter to the experiments	Ax in {Orbit} & Bx in {Power}	0.2Hz
CCR_BC_x	Ax={dip/acc/LHC/Timing/RxClocks/F40_Bx} and Bx={dip/acc/LHC/Timing/TxClocksPower/CCR_B1B2/POWER_Bx}	Bunch Clock status at the CCR: signal frequency received from the SR4 and power of the transmitter for to experiments	Ax in {Bunch Clock} & Bx in {Power}	0.2Hz
ALICE_Or_x	dip/ALICE/LHC/Timing/RFRX/FREV_Bx	Revolution Frequency (orbit) of beam x: signal frequency received at ALICE	Orbit	0.2Hz
ALICE_BC_x	dip/ALICE/LHC/Timing/RFRX/F40_Bx	Bunch Clock of beam x: signal frequency received at ALICE	Bunch Clock	0.2Hz
ALICE_QPLL_x	{dip/ALICE/LHC/Timing/BunchClock/ BCx_QPLL_Lock*}	ALICE QPLL Lock status of the RF2TTC for BCx (Registers 7FBE8 or 7FBB8)	QPLL	0.2Hz
ATLAS_Or_x	dip/ATLAS/LHC/Timing/RFRX/FREV_Bx	Revolution Frequency (orbit) of beam x: signal frequency received at ATLAS	Orbit	0.2Hz
ATLAS_BC_x	dip/ATLAS/LHC/Timing/RFRX/F40_Bx	Bunch Clock of beam x: signal frequency received at ATLAS	Bunch Clock	0.2Hz
ATLAS_QPLL_x	{dip/ATLAS/LHC/Timing/BunchClock/ BCx_QPLL_Lock*}	ATLAS QPLL Lock status of the RF2TTC for BCx (Registers 7FBE8 or 7FBB8)	QPLL	0.2Hz
CMS_Or_x	dip/CMS/LHC/Timing/RFRX/FREV_Bx	Revolution Frequency (orbit) of beam x: signal frequency received at CMS	Orbit	0.2Hz
CMS_BC_x	dip/CMS/LHC/Timing/RFRX/F40_Bx	Bunch Clock of beam x: signal frequency received at CMS	Bunch Clock	0.2Hz
CMS_QPLL_x	{dip/CMS/LHC/Timing/BunchClock/ BCx_QPLL_Lock*}	CMS QPLL Lock status of the RF2TTC for BCx (Registers 7FBE8 or 7FBB8)	QPLL	0.2Hz
LHCb_Or_x	dip/LHCb/LHC/Timing/RFRX/FREV_Bx	Revolution Frequency (orbit) of beam x: signal frequency received at LHCb	Orbit	0.2Hz
LHCb_BC_x	dip/LHCb/LHC/Timing/RFRX/F40_Bx	Bunch Clock of beam x: signal frequency received at LHCb	Bunch Clock	0.2Hz
LHCb_QPLL_x	{dip/LHCb/LHC/Timing/BunchClock/BCx_QPLL_Lock*}	LHCb QPLL Lock status of the RF2TTC for BCx (Registers 7FBE8 or 7FBB8)	QPLL	0.2Hz

*: new publication - not settled yet

3 Last QPLL unlock event

Last QPLL unlock events	B1	B2
ALICE:	19-Feb-2014 09:03:45	19-Feb-2014 09:03:45
ATLAS:	19-Feb-2014 09:03:45	19-Feb-2014 09:03:45
CMS:	19-Feb-2014 09:03:45	19-Feb-2014 07:03:45
LHCb:	19-Feb-2014 09:03:45	15-Feb-2014 19:03:45

Table 4: Parameter table for field 3

Ref	Source (dip_path/PublicationName/ValueName)	type	description	Refresh rate
ALICE /Bx	dip/ALICE/LHC/Timing/BunchClock/ BCx_QPLL_Timestamp*	Time**	Time of the beginning of the last unlocking period	0.1Hz
ATLAS /Bx	dip/ATLAS/LHC/Timing/BunchClock/ BCx_QPLL_Timestamp*	Time**	Time of the beginning of the last unlocking period	0.1Hz
CMS /Bx	dip/CMS/LHC/Timing/BunchClock/ BCx_QPLL_Timestamp*	Time**	Time of the beginning of the last unlocking period	0.1Hz
LHCb /Bx	dip/LHCb/LHC/Timing/BunchClock/ BCx_QPLL_Timestamp*	Time**	Time of the beginning of the last unlocking period	0.1Hz

*: new publication - not settled yet

**: in seconds (unsigned int) - UTC seconds since 1970

4 RF and Beam Status

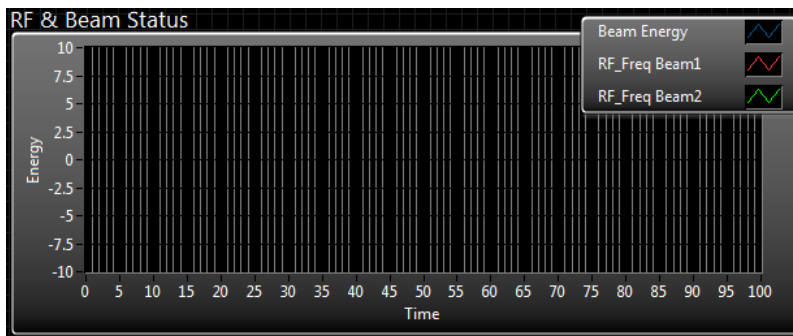


Table 5: Parameter table for field 4

Ref	Source (dip_path/PublicationName/ValueName)	type	units	description	Refresh rate
Beam Energy	dip/acc/LHC/Beam/Energy/payload	int	GeV	0-7000	0.1 Hz
RF_Freq Beam1	dip/ATLAS/LHC/Timing/FreqBC1/Freq*	double	Hz	40078410-40078990	0.1 Hz
RF_Freq Beam2	dip/ATLAS/LHC/Timing/FreqBC2/Freq*	double	Hz	40078410-40078990	0.1 Hz

*: new publication - not settled yet

Horizontal Graph Scale:

- Displays date and time on the scale
- If Beam Mode = STABLE BEAM, then scales with time (accumulates from start of STABLE BEAM until current). If necessary (long runs), then some sort of filtering or averaging of the data should be applied to allow displaying the full Stable Beam duration.
- Else: displays the last 30mn only

Vertical Graph Scale:

- autoscales within a min/max limit of 40078410-40078990. If short in space for displaying the frequency, use only the 5 smaller digits.
- If a FreqBCx exceeds the above-defined limits, displays the points at the max or min limit of the window

Display points of a plot only if

- DIP quality of the publication is "GOOD"
- The DIP publication timestamp as changed between the 2 last points

5 BC and Orbit phase shift versus temperature

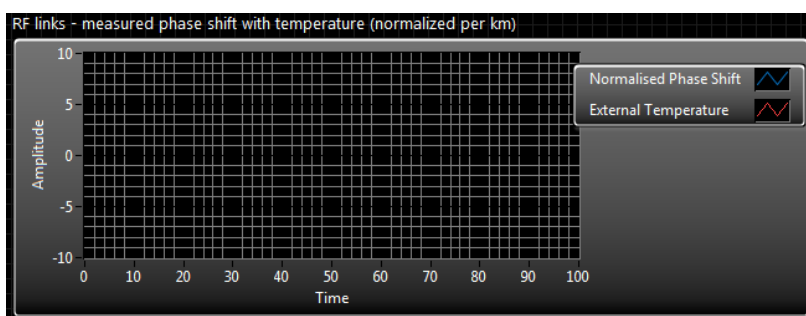


Table 6: Parameter table for field 5

Ref	Source (dip_path/PublicationName/ValueName)	type	units	description	Refresh rate
Normalised Phase Shift	dip/ATLAS/LHC/Timing/PhaseShift*	float	ns	Typically [-1;+1]	5 mn
External Temperature	dip/RAMESSES/METEO/MSPA901/MSPA901_T	double	C	Typically -30 /+40	5 mn

Horizontal Graph Scale:

- Displays date and time on the scale
- Last 24h

Vertical Graph Scale:

- Autoscale only

Display points of a plot only if

- DIP quality of the publication is "GOOD"
- The DIP publication timestamp as changed between the 2 last points

Longitudinal data from Experiments

6 Recap table (current values)

	BC MAIN	DeltaT (ns)	Phase1 (ns)	Phase2 (ns)	Zcentroid (mm)
ALICE	BC1	0.2	0.2	0.2	0.3
ATLAS	BC1	0.01	-	0.01	0.1
CMS	1 LOCAL	0.1	0	0	0
LHCb	BC2	1	1	1	0.5

Table 7: Parameter table for field 6

Ref	Source (dip_path/PublicationName/ValueName)	type	units	description	Refresh rate
1	dip/EXPT/LHC/Timing/BunchClock/BCMainSource*	string		BCMain selection: LOCAL/ BC1/ BC2	On change/ 0.2Hz
2	dip/EXPT/LHC/Timing/BPTX/deltaT	float	ns	Delay between 2 BPTX	0.2 Hz
3	dip/EXPT/LHC/Timing/BPTX1/Phase	float	ns	Delay between BPTX1 and BCmain	0.2 Hz
4	dip/EXPT/LHC/Timing/BPTX2/Phase	float	Ns	Delay between BPTX2 and BCmain	0.2 Hz
5	dip/EXPT/LHC/LuminousRegion/Centroid[3]	float	mm	Luminous region longitudinal position (z)	0.2 Hz

*: new publication - not settled yet

Note:

- if DIP quality is not "Good" or if the publication timestamp did not change since last publication, display "Bad Quality"
- if the DIP publication is unreachable, display "N/A"
- if the value of 2, 3, 4 is <-99ns or >99ns, display "<-99" or ">99"
- Out of "stable beam", display "-" on Zcentroid values

7 DeltaT graph

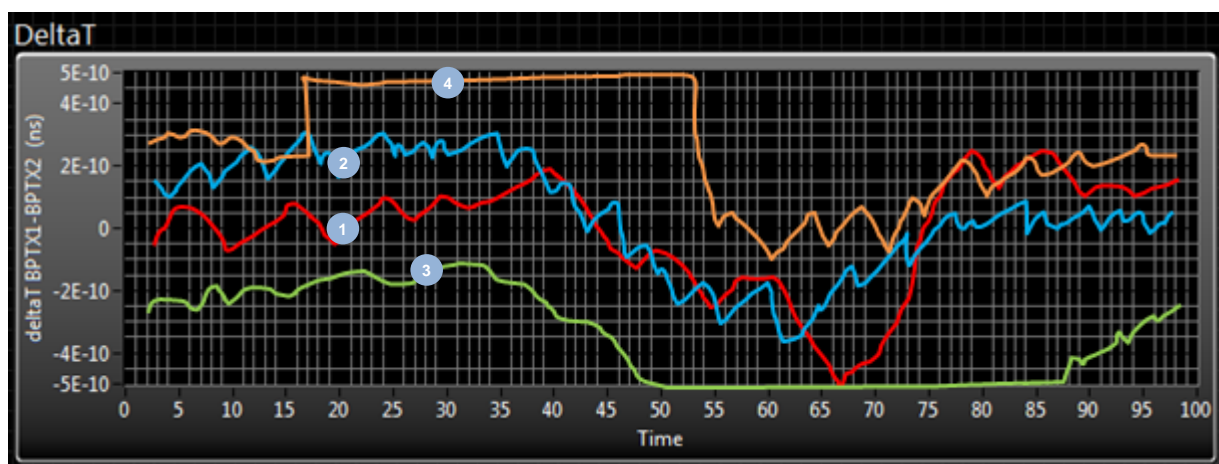


Table 8: Parameter table for field 7

Ref	Source (dip_path/PublicationName/ValueName)	type	units	description	Refresh rate
1	dip/ALICE/LHC/Timing/BPTX/deltaT	Float	ns		0.2 Hz
2	dip/ATLAS/LHC/Timing/BPTX/deltaT	Float	ns		0.2 Hz
3	dip/CMS/LHC/Timing/BPTX/deltaT	Float	ns		0.2 Hz
4	dip/LHCb/LHC/Timing/BPTX/deltaT	Float	ns		0.2 Hz

Horizontal Graph Scale:

- Displays date and time on the scale
- If Beam Mode = STABLE BEAM, then scales with time (accumulates from start of STABLE BEAM until current). If necessary (long runs), then some sort of filtering or averaging of the data should be applied to allow displaying the full Stable Beam duration.
- Else: displays the last 30mn only

Vertical Graph Scale:

- Centred around 0
- If Beam Mode = STABLE BEAM, then autoscales within a max/min limit of +0.3ns/-0.3ns
- Else: autoscales within a max/min limit of +1ns/-1ns
- If a deltaT exceeds the above-defined limits, displays the points at the max or min limit of the window

Display points of a plot only if

- DIP quality of the publication is "GOOD"
- the DIP publication timestamp as changed between the 2 last points
- The source of the BC MAIN is not 'LOCAL' (dip/EXPT/LHC/Timing/BunchClock/BCMainSource*)

8 Phase graph

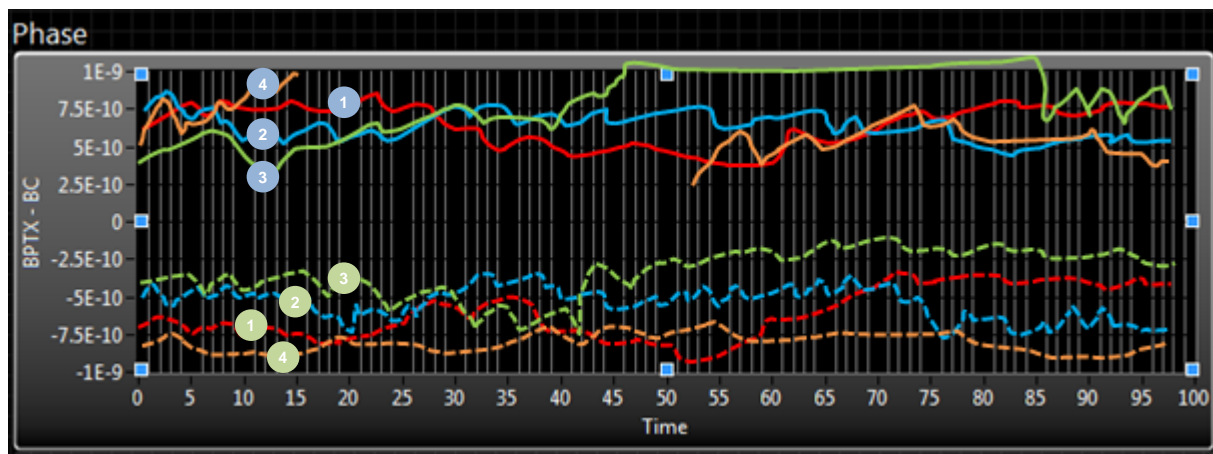


Table 9: Parameter table for field 8

Ref	Source (dip_path/PublicationName/ValueName)	type	units	description	Plot color	Refresh rate
1	dip/ALICE/LHC/Timing/BPTX1/phase	Float	ns	ALICE: Delay between BPTX1 and BCmain		0.2 Hz
1	dip/ALICE/LHC/Timing/BPTX2/phase	Float	ns	ALICE: Delay between BPTX2 and BCmain		0.2 Hz
2	dip/ATLAS/LHC/Timing/BPTX1/phase	Float	ns	ATLAS: Delay between BPTX1 and BCmain		0.2 Hz
2	dip/ATLAS/LHC/Timing/BPTX2/phase	Float	ns	ATLAS: Delay between BPTX2 and BCmain		0.2 Hz
3	dip/CMS/LHC/Timing/BPTX1/phase	Float	ns	CMS: Delay between BPTX1 and BCmain		0.2 Hz
3	dip/CMS/LHC/Timing/BPTX2/phase	Float	ns	CMS: Delay between BPTX2 and BCmain		0.2 Hz
4	dip/LHCb/LHC/Timing/BPTX1/phase	Float	ns	LHCb: Delay between BPTX1 and BCmain		0.2 Hz
4	dip/LHCb/LHC/Timing/BPTX2/phase	Float	ns	LHCb: Delay between BPTX2 and BCmain		0.2 Hz

Horizontal Graph Scale:

- Displays date and time on the scale
- If Beam Mode = STABLE BEAM, then scales with time (accumulates from start of STABLE BEAM until current). If necessary (long runs), then some sort of filtering or averaging of the data should be applied to allow displaying the full Stable Beam duration.
- Else: displays the last 30mn only

Vertical Graph Scale:

- Centred around 0
- If Beam Mode = STABLE BEAM, then autoscales within a max/min limit of +0.3ns/-0.3ns

- Else: autoscales within a max/min limit of +1ns/-1ns
- If a deltaT exceeds the above-defined limits, displays the points at the max or min limit of the window

Display points of a plot only if

- DIP quality of the publication is "GOOD"
- The DIP publication timestamp as changed between the 2 last points
- Example on the graph: 4 was not displayed between 15 and 50 because at least one of the above conditions was not met

9 *Lumi Centroid z graph*

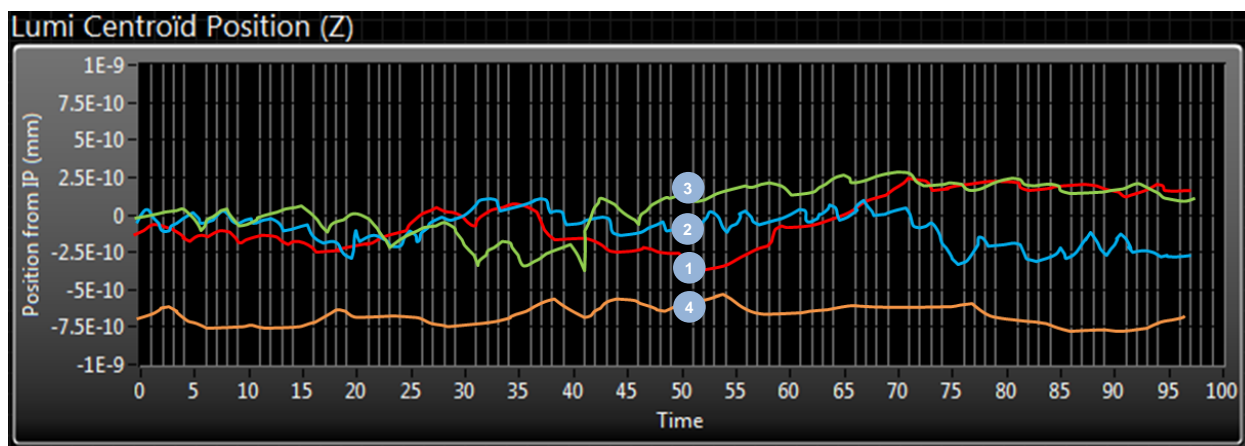


Table 10: Parameter table for field 9

Ref	Source (dip_path/PublicationName/ValueName)	type	units	description	Publication Frequency
1	dip/EXPT/LHC/LuminousRegion/Centroid[3]	Float	mm		1 / minute
2	dip/EXPT/LHC/LuminousRegion/Centroid[3]	Float	mm		1 / minute
3	dip/EXPT/LHC/LuminousRegion/Centroid[3]	Float	mm		1 / minute
4	dip/EXPT/LHC/LuminousRegion/Centroid[3]	Float	mm		1 / minute

Update Graph only during STABLE BEAM.

Clean the Graph out of STABLE BEAM.

Horizontal Graph Scale:

- Displays date and time on the scale
- If Beam Mode = STABLE BEAM, then scales with time (accumulates from start of STABLE BEAM until current). If necessary (long runs), then some sort of filtering or averaging of the data should be applied to allow displaying the full Stable Beam duration.
- If possible, try to keep the graphs 7, 8 and 9 on the same timescale to be able to detect concurrent events on the 3 plots.

Vertical Graph Scale:

- Centred around 0
- If Beam Mode = STABLE BEAM, then autoscales within a max/min limit of +50mm/-50mm
- If a Centroid position exceeds the above-defined limits, displays the points at the max or min limit of the window

Display points of a plot only if

- DIP quality of the publication is "GOOD"
- The DIP publication timestamp as changed between the 2 last points