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# Run II Data Alignment

## Automatic update of the constants

The automatic update of the constants was switched on the 23/10/2015 for the VELO and the 3/11/2015 for the Tracker, more information and monitoring plots can be found in the logbook

<http://lblogbook.cern.ch/Alignment+monitoring/>

## Versions of 2016 restarting of data taking

Period	VeloGlobal	VeloModules	TTGlobal	TTModules	ITGlobal	ITModules	OTGlobal	OTModules
First fill	v69	v36 (v12)	v55 (v37)	v55 (v37)	v66 (v38)	v10	v55 (v37)	v55 (v37)
2016-23-04	v71	v36 (v12)	v55 (v37)	v55 (v37)	v66 (v38)	v10	v55 (v37)	v55 (v37)
2016-24-04	v71	v36 (v12)	v56	v56	v67	v10	v56	v56

We copied the version in parenthesis so that the starting version was the last one at the beginning of the data taking

## List of alignment version used in hlt1, hlt2 and offline (consistently the same)

Time Validity	Run Range	Fill Range	Velo	Tracker	Comments
2015-06-03 09:30 - 2015-06-12 11:50	??-154624	3590 - 3854	-	-	2012 tracker alignment, 2014 Velo alignment
2015-06-12 11:50 - 2015-06-13 12:25	154625-154742	3855 -3855	updated	updated	First 2015 alignment, 1 IT box misaligned by ~1-2 mm
2015-06-13 12:25 - 2015-07-07 13:01	154791-157174	3857- 3971		-updated	First complete 2015 alignment (almost same quality as 2012 alignment)
2015-07-07 13:01 - 2015-08-14 17:20	157180-160155	3974-4207		-updated	Adding the IT y alignment and small correlated tracker alignment update
2015-08-14 17:20 - 2015-08-19 18:20	160156-160606	4208-4231		-updated	small tracker alignment update after magnet polarity flip
2015-08-19 18:20 - 2015-09-08 09:59	160716-162412	4243-4331	updated	-	VELO alignment update as constant y misalignment of ~2um seen in previous fills
2015-09-08 09:59 -	162413-	4332-	-	updated	small tracker alignment update after magnet polarity flip

Summary of the version number used

Time Validity	Run Range	Fill Range	VeloGlobal	VeloModules	TTglobal	TTmodules	ITglobal	ITmodules
2015-06-03 09:30 - 2015-06-12 11:50	??-154624	3590 - 3854	v2	v2	v4	v4	v4	v4
2015-06-12 11:50 - 2015-06-13 12:25	154625- 154742	3855 -3855	v5	v5	v7	v7	v7	v7
	154791- 157174	3857- 3971	v5	v5	v8	v8	v9	v7

2015-06-13 12:25 - 2015-07-07 13:01									
2015-07-07 13:01 - 2015-08-14 17:20	157180-160155	3974-4207	v5	v5	v9	v9	v10	v7	
2015-08-14 17:20 - 2015-08-19 18:20	160156-160606	4208-4231	v5	v5	v10	v10	v11	v7	
2015-08-19 18:20 - 2015-09-08 09:59	160716-162412	4243-4331	v12	v12	v10	v10	v11	v7	
2015-09-08 09:59 -	162413-	4332-	v12	v12	v14	v14	v15	v7	

## List of alignment version in /group/online/alignment

- VELO Alignment

- ◆ version

- ◇ v1 latest 2012 alignment
    - ◇ v2 ted 2014
    - ◇ v3 using long tracks affected by IT misalignment (tracker v4) run 153543-153545
    - ◇ v4 equal to v2
    - ◇ v5 using refitted velo segment
    - ◇ v6 - v16 ... obtained with the automatic procedure on the runs 158517 - 160597 always starting from the previous alignment. The alignment is updated using only the chi2 criterium so there is a new alignment per run. Fore some runs the alignment was run twice as a test
    - ◇ v12 obtained during tests automatisation (see previous bullet). It is obtained on the run 160298 starting from v11
    - ◇ v36 Modules and v39 Global are a copy of v12 so that when switching on the automatic update the first iteration (first fill after fill 4525) sees the actual conditions used

- ◆ dof and constraint

- ◇ Until fill 4495
      - Module Tx,Ty,Tz,Rz
      - 2 halves Tx,Ty,Tz,Rx,Ry,Rz
      - Constraints: average module position and average position of the 2 half
    - ◇ From fill 4496
      - 2 halves Tx,Ty,Tz,Rx,Ry,Rz
      - Constraints: average position of the 2 half

- Tracker Alignment

- ◆ version

- ◇ v4 2012 alignment
    - ◇ v5 2012 alignment + IT survey
    - ◇ v6 between 154182 and 154193 with 10 iterations
    - ◇ v7 between 154182 and 154193 with other 10 iteration
    - ◇ v8 between 154182 and 154193. Start from v7 and corrected bug (affected IT1 A side box) converged after 7 iterations.

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- ◇ v9 IT Global: v8 + y-alignment. v7 IT Modules, v8 others
- ◇ v10 IT Global, v7 IT Modules, v9 others: run 156916. Start from v8 + y-alignment (ITGlobal v9); converged after 2 iterations
- ◇ v11 IT Global, v7 IT Modules, v10 others: run 160059. Start from previous conditions; converged after 3 iterations
- ◇ v15 IT Global, v7 IT Modules, v14 others: run 162257. Start from previous conditions; converged after 2 iterations; magnet polarity flip.
- ◇ v23 ITGlobal and v22 OT/TT Global/Modules are a copy of v15 (ITGlobal) and v14 (the others) so that when switching on the automatic update the first iteration (first fill after fill 4565) sees the actual conditions used
- ◆ dof and constraint
  - ◇ TT modules Tx, Rz
  - ◇ TT layer Tz
  - ◇ IT boxes Tx, Tz, Rz
  - ◇ OT C-frame Tx, C-frame layers Tz
  - ◇ TT is fixed in its nominal z position and so is OT3-1.

## Muon alignment

First alignment during the calibration run (run numbers 154860-154888) required a mechanical movement to get an optimal configuration (good projectively wrt the IP and symmetry wrt the beam pipe): With respect to the ideal projective position:

- M2-M5 C-side ~3.5 mm closer from the beam,
- M2-M5 A-side ~1.0 mm away from the beam
- M1 C-side ~ 1.6 mm away from the beam,
- M1 A-side ~ 2.2 mm closer to the beam.

Mechanical movement on 18th June to reassure a better projectivity and symmetry.

- M1 A side: closed 2.45mm
- M1 C side: opened 1.75 mm
- M2-5 A side: closed 1.0 mm
- M2-5 C side: opened 2.5mm

New alignment based on the tracking during EM (run 156916) fills. With respect to the ideal projective position:

- A-side M2-M5 closer by ~ 1-1.5 mm,
- C-side is almost as expected (within mm).

Change of look up table using this latest alignment (active from fill 3981). New LHCBCOND with Local tag muon-20150724 and IOV=8 Aug 2015

## Prescaling Collisions for VELO alignment

the prescaling can be changed in the file

/group/online/dataflow/cmtuser/OnlineRelease/Online/FarmConfig/options/AlignWriter.opts at row 75:

```
"EvType=2;TriggerMask=0x0,0x00000020,0x0,0x0;VetoMask=0,0,0,0;MaskType=ANY;UserType=VIP;Frequency=
```

05/10/2018 changed from 0.00001 to 0.01 for PbPb

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25/04/2018 changed from 0.001 to 0.00001 (after beginning fill 6613)

24/04/2018 changed from 0.1 to 0.001 (after beginning fill 6611)

21/04/2018 changed from 100 to 0.1 for the 300 colliding bunches fill (6594)

12/04/2018 changed from 0.001 to 100 to have enough stats for the beginning of the data taking

The 12/04/2018 there was a change of the routing bit for collisions from 46 to 37 so the line modified was the one below

```
"EvType=2;TriggerMask=0x0,0x00004000,0x0,0x0;VetoMask=0,0,0,0;MaskType=ANY;UserType=VIP;Frequency=
```

12/11/2017 changed from 0.0001 to 0.001 as we are collecting at the same time collisions and beamgas

19/07/2017 changed from 0.0001 to 0.00001 as also after previous change there was only a few percent of beamgas events collected

16/07/2017 changed from 0.001 to 0.0001 to see if it takes more than a few seconds to collect enough events

20/06/2017 changed from 100 to 0.001 as we have now more colliding bunches

27/05/2017 changed from 100 to 0.01 as we have now more colliding bunches

12/05/2017 changed from 1.01 to 100 to collect enough events with 2 colliding bunches

26/11/2016 changed to 100 to collect enough events with PbPb

15/03/2016 changed to 0.001 as was during 2015

22/04/2016 changed to 100 to collect quickly enough statistics with only 3 colliding bunches

14/05/2016 (after fill 4925) changed to 0.01 as now we have more colliding bunches

7/11/2015 changed to 1 to collect enough events with PbPb, let's see if it is enough

14/11/2015 changed back to 0.01 because it seems that would be enough

18/11/2015 changed to 1.01 for the p-Pb with the 8 TeV

-- SilviaBorghi - 2015-06-13

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This topic: LHCb > 2015alignment

Topic revision: r50 - 2018-11-05 - GiulioDujany



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