

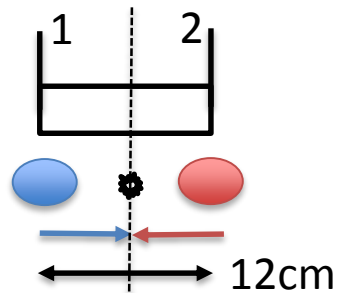


**High
Luminosity
LHC**

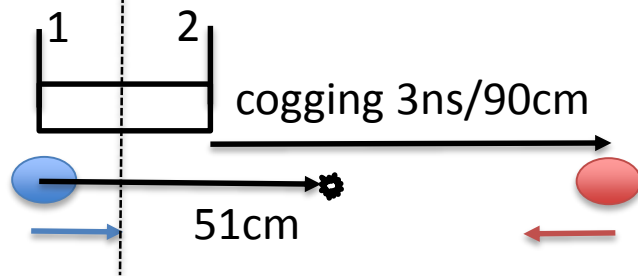
Blind area specification from Doros MD

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Blind area specification from Doros MD



Traces from Port 1 and Port 2 overlaps in time. Strong correlation between Beam 1 and Beam 2 positions.



Traces from Port 1 and Port 2 are separated by 3 ns. On average, no observed correlations between Beam 1 and Beam 2 positions.

The LR position should 51 cm far from the closest port or $51+6 = 57$ cm from the center of the BPM. Due to the presence of 80 MHz LP filter in the Doros front end, this condition is not too sensitive to changes of bunch lengths.

Specification: The central position of the BPM should be outside an area defined by ± 57.0 cm from the position of the long range interactions.

HLLHCv1.2 BPM positions

	BPM	BPM [m]	LR [#]	Delta [m]
1	TAXS-Q1	22.053	6	-0.387
2	Q1b-Q2a	33.193	9	-0.467
3	Q2a-Q2b	43.978	12	-0.902
4	Q2b-Q3a	54.763	15	-1.337
5	Q3b-CP	65.903	18	-1.417
6	CP-D1	73.619	20	-1.181
7	D1-TAXN	82.089	22	-0.192

Blind area |Delta|<0.57 m

Negative Delta BPM is in between IP and LR

If Q1 assembly is moved by 183 mm towards the IP, BPM 1 and 2 become effective.

In alternative at the expenses of β^* reach and further layout changes:

- Q1 should be moved by 1037 mm towards the arc
- Q2a should be moved by 1472 mm towards the arc
- Q2b should be moved by 1907 mm towards the arc
- Q3a should be moved by 1987 mm towards the arc

From integration studies

Option 1: BPM in the experiment with difficult alignment, BPM inside Q1 in blind area but with good alignment. Not yet feasible due to cryogenics and ATLAS openings.

Option 2: no BPM in the experiment, BPM outside Q1 with bad alignment and not in blind area. No solution for alignment and leaks.

Option 3: BPM in the TAXS with bad alignment and access, BPM inside Q1 good alignment.

Option 4: $L_s=24$ m, degradation of pre-squeeze and squeezed β^* .

Option 5: $L_s=22.8$ m no BPM in experimental area, BPM in Q1 in the good area, well aligned and more reliable, difficult to move Q1 towards the IP.

Option 6: Attach TAXS to Q1, mechanically difficult.