MD6949: Validation of bunch-by-bunch detectors functionality

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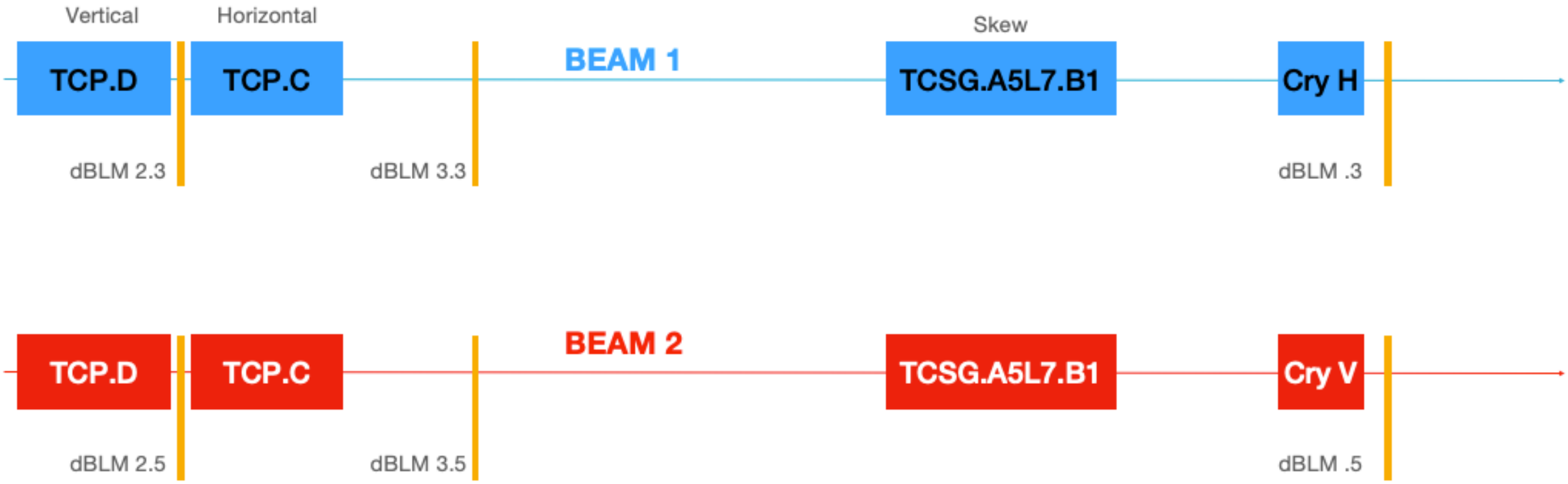
Installation of diamond BLM in LHC

LHC location	Detector Name	FESA Device Name
LHC IP2 – injection B1	BLMD.29211_B1I10_TCDIH.29206	SP.UA23.BLMDIAMOND.3
LHC IP2 – injection B1	BLMED.04L2.B1C10_TDIS.4L2.B1	HC.UA23.BLMDIAMOND.5
LHC IP8 – injection B2	BLMD.87827.B2I10_TCDIH.87822	SP.UA87.BLMDIAMOND.3
LHC IP8 – injection B2	BLMED.04R8.B2C10_TDIS.4R8.B2	HC.UA87.BLMDIAMOND.5
LHC IP6 – dump B1	BLMED.04R6.B1E10_TCSG.4R6.B1	HC.US65.BLMDIAMOND.3
LHC IP6 – dump B2	BLMED.04L6.B2I10_TCSG.4L6.B2	HC.US65.BLMDIAMOND.5
LHC IP7 – B1	BLMED.06L7.B1B10_TCP.D6L7.B1	HC.TZ76.BLMDIAMOND2.3
LHC IP7 – B1	BLMED.06L7.B1T10_TCHSS.6L7.B1	HC.TZ76.BLMDIAMOND3.3
LHC IP7 – B1	BLMED.04L7.B1B10_TCPCH.A4L7.B1	HC.TZ76.BLMDIAMOND.3
LHC IP7 – B2	BLMED.06R7.B2B10_TCP.D6R7.B2	HC.TZ76.BLMDIAMOND2.5
LHC IP7 – B2	BLMED.06R7.B2T10_TCHSS.6R7.B2	HC.TZ76.BLMDIAMOND3.5
LHC IP7 – B2	BLMED.06R7.B2B10_TCPCV.A6R7.B2	HC.TZ76.BLMDIAMOND.5

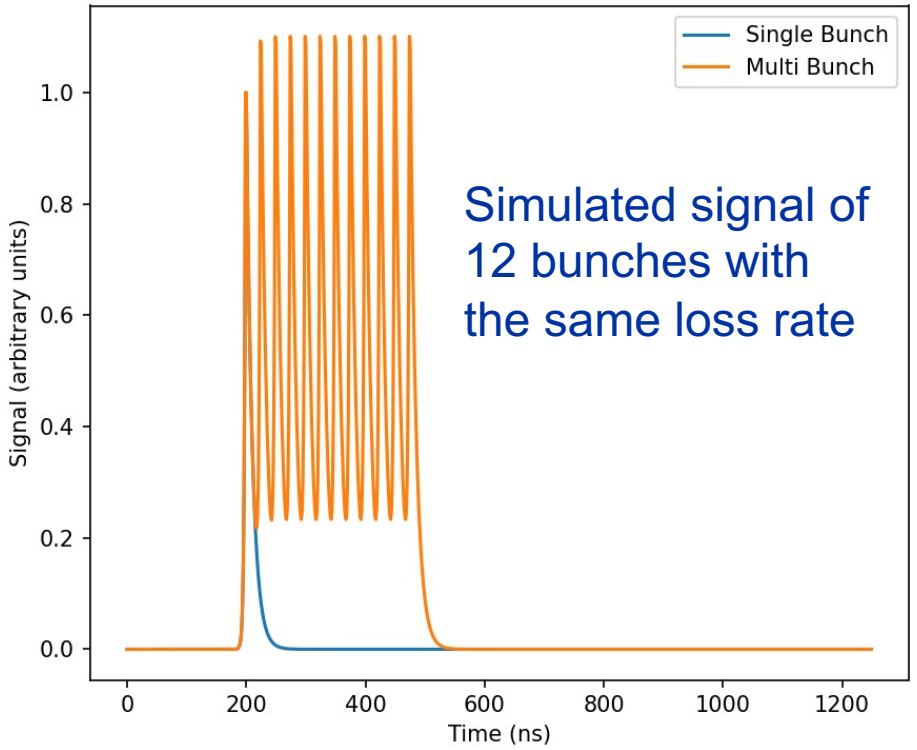
This MD is targeted to study the bunch-by-bunch measurement of beam losses from collimation cleaning

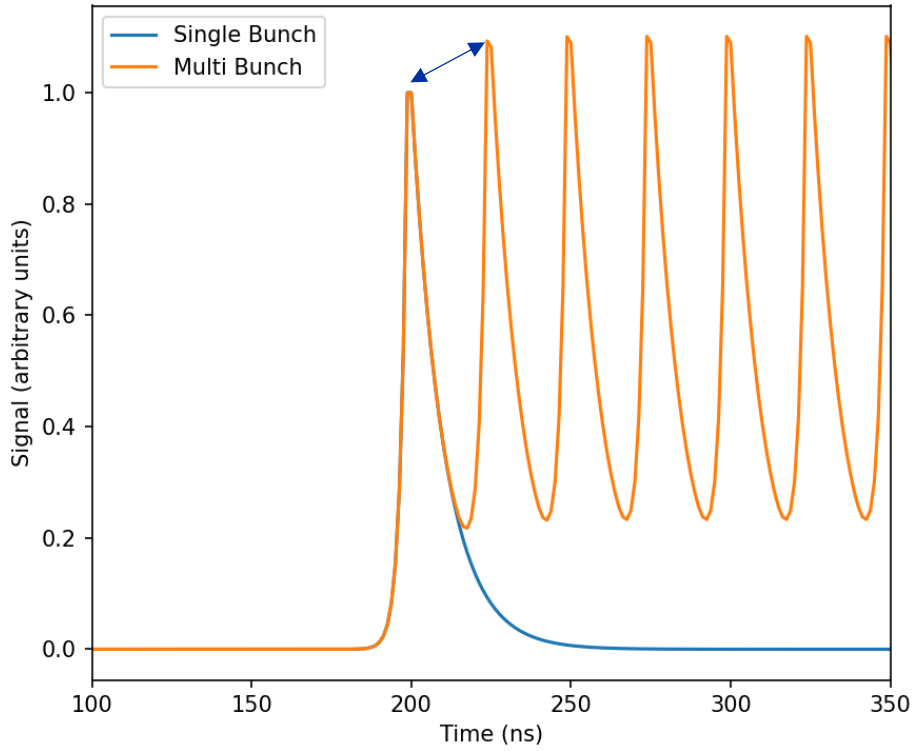
Geometry


Vertical
Horizontal
Skew
TCP.D
TCP.C
BEAM 1
TCSG.A5L7.B1
Cry H
dBLM 2.3
dBLM 3.3
dBLM .3
TCP.D
TCP.C
BEAM 2
TCSG.A5L7.B1
Cry V
dBLM 2.5
dBLM 3.5
dBLM .5

Diamond Signal

Diamond Detector have a rise/decay time of the order of ns, meaning that for 25 bunch spacing signals will overlap.



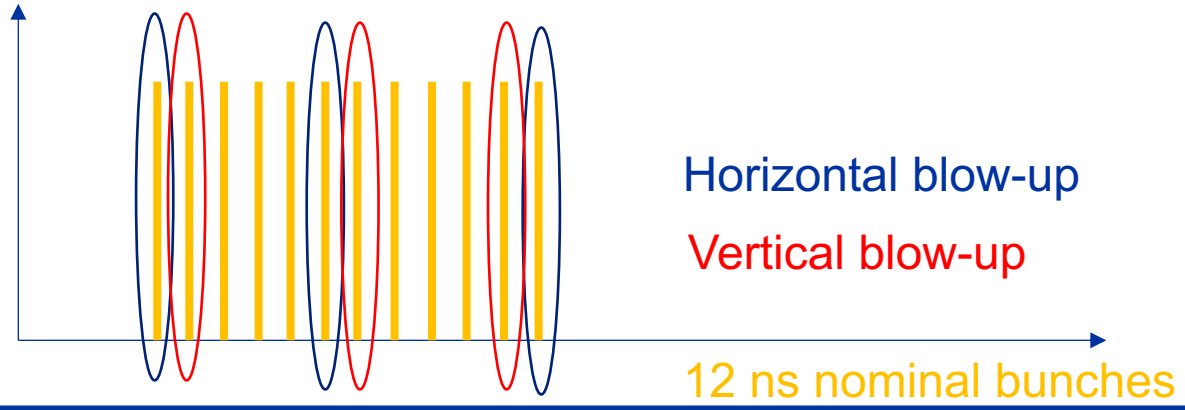


MD description – 12 nominal bunches

Part with 12 nominal bunches – **Nominal collimation hiearchy – no BIC masking**

- Use ADT blow-up to create losses in vertical plane, were losses in dBLM2.3 and dBLM 3.3 are expected.
- Use ADT blow-up to create losses in horizontal plane, were losses mainly in dBLM 3.3 are expected.

This needs to be done slowly as it was done for the blow-up of 1st bunch during physics fills in Run 2 for UFO studies. The goal is to generate losses in different bunch slots to study how the signal from one bunch mixes with the signal from the neighboard bunch slot.



MD description – pilot bunches – below SBF

Part with single pilot bunches – **Single Stage collimation hiearchy as used during commissioning – mask BIC Collimators/BLM**

- Use ADT blow-up to create losses in vertical plane, were losses in dBLM2.3 and dBLM 3.3 are expected.
- Use ADT blow-up to create losses in horizontal plane, were losses mainly in dBLM 3.3 are expected.
- Bring in the TCSG 5L7 / 5R7 and used ADT blow-up to create losses in horizontal plan, were losses in the 3 dBLM are expected.

Use this data to adjust/verify the phasing of the detectors and depending on the time other functionalities like the BST bunch selection on the capture data, capture triggered by timing, capture triggered by losses UFO-event auto-trigger.