

# Instrumentation Performance in the SPS in 2015 & Requirements for the Future

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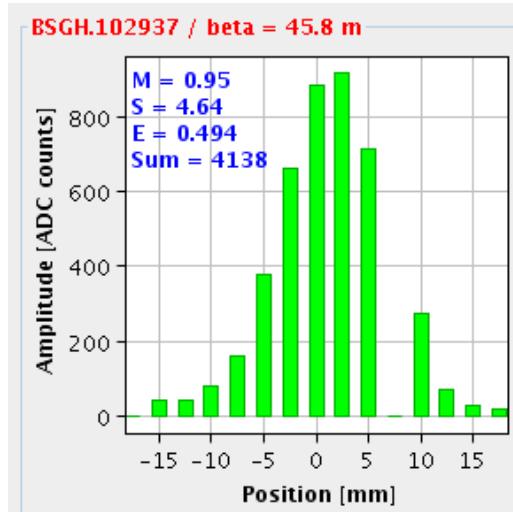
On behalf of SPS Operation

# Outline

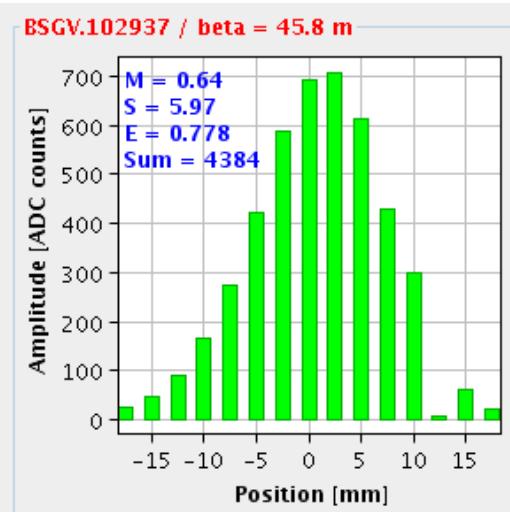
- Issues
  - o SEM
  - o BTV
  - o BPM
  - o BLM
  - o BCT
  - o Wirescanners
- Requirements
- Outlook
- Conclusion

# Issues

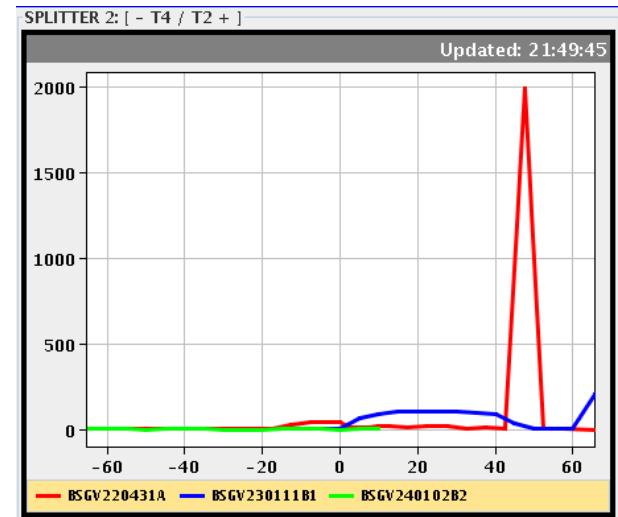
- SEM (position and profile monitors)
  - SEM-grids in TT10 and TT20 have dysfunctional channels



BSG.102937



BSGV.220431



- BBS.21638 : Stuck in OUT position. The coupling was loose
  - Good reaction by BI, now fixed

- BTVS.11994 was misaligned → difficult alignment during YETS by EN-ACE
- BTV.21003 and BTV.61003 working fine but no longer used by OP
  - still to be removed
- BTV.42194 no longer used by OP and even disconnected → to be removed
- BTVE screen references in LSS4 and LSS6 are now coherent
- NA:
  - BTV.211628 → Screen stuck
  - BTV.240119 and BTV.250118 → Lamp out of order
  - BTV.43061, BTV.43515 and BTV.45832 → no longer used by OP

FESA3 migration was a success for all BTVs (BA8 not concerned)

# BPM

- Amplitude and phase drift on the cable length:

Type	Position					
<b>BPH</b>	10208	11008	11408	23008	30208	32208
	41008	41608	50608	51208	52808	60408
<b>BPV</b>	22508	31308	32508	40108	42108	60708
<b>BPCN</b>	12308	12508				
<b>BPCE</b>	41801	61931				

- Electronics failures:

Type	Position		
<b>BPH</b>	31808	51408	52608
<b>BPV</b>	10308		
<b>BPCE</b>	41705		

- Hybrid changes:

Type	Position
<b>BPH</b>	20808
<b>BPD</b>	11833

# BPM(2)

- Adaptor changes:

Type	Position		
BPH	20808	23408	60808

- Reconnected:

Type	Position
BPH	52008

- Needed a calibration:

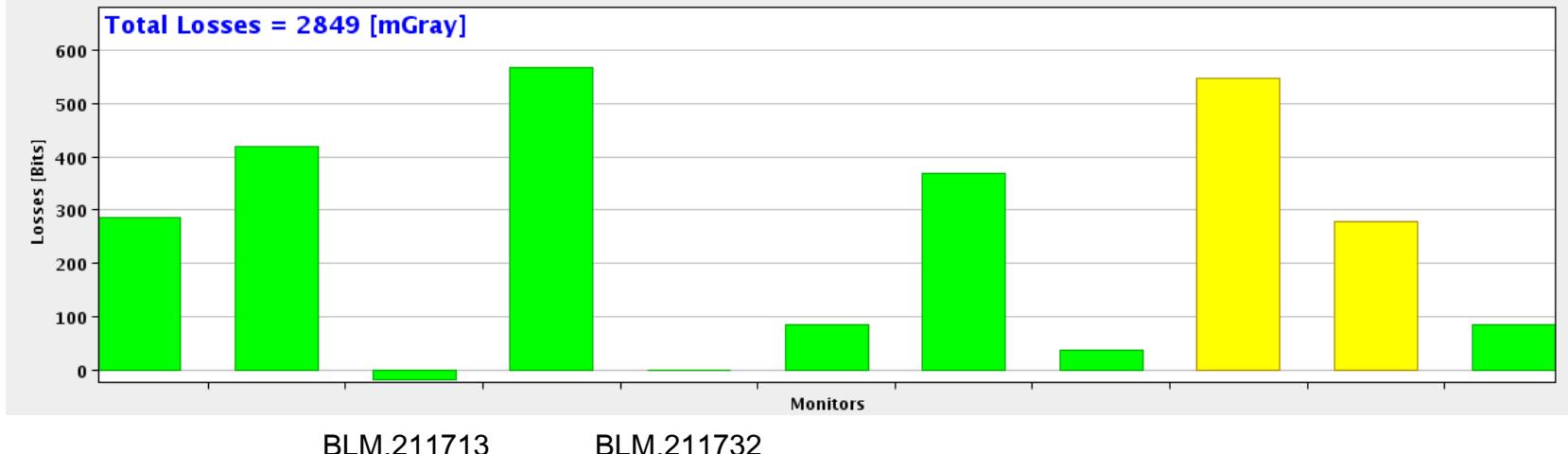
Type	Position
BPH	22408
BPV	30708

- Still an offset even after calibration:

Type	Position / Offset[mm]	
BPH	13008 / -0.9	20808 / -2.3
BPV	42108 / 1.5	

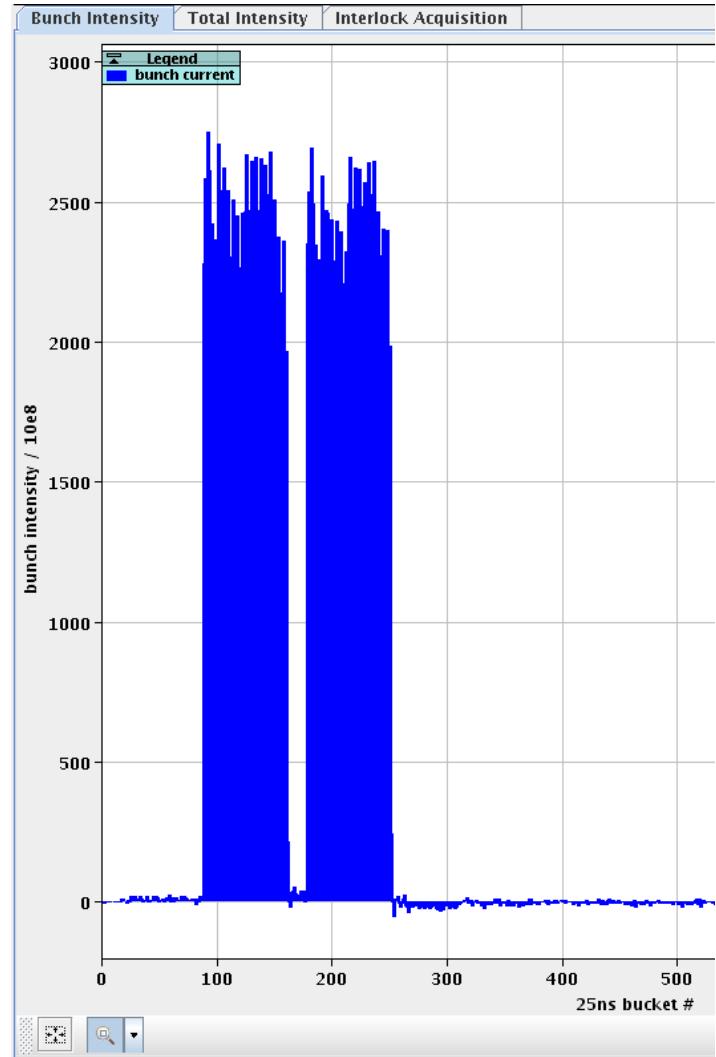
# BLM

- SPS.BLM.21652.ZS2 and SPS.BLM.21674.ZS4 were out of order – no signal
  - All BLMs have been changed around the ZS – Efficiently
- NA:
  - TT20.BLM.211713 → Negative signal
  - TT20.BLM.211732 → No signal



# BCT

- BCTFR.31450 and BCTFR.51895
  - Intensity histogram doesn't correspond to reality
  - Difficulty to adjust the phase
  - Not possible to measure with fixed frequency acceleration (Ions)
  
- BCTDC.11601 → still to be removed



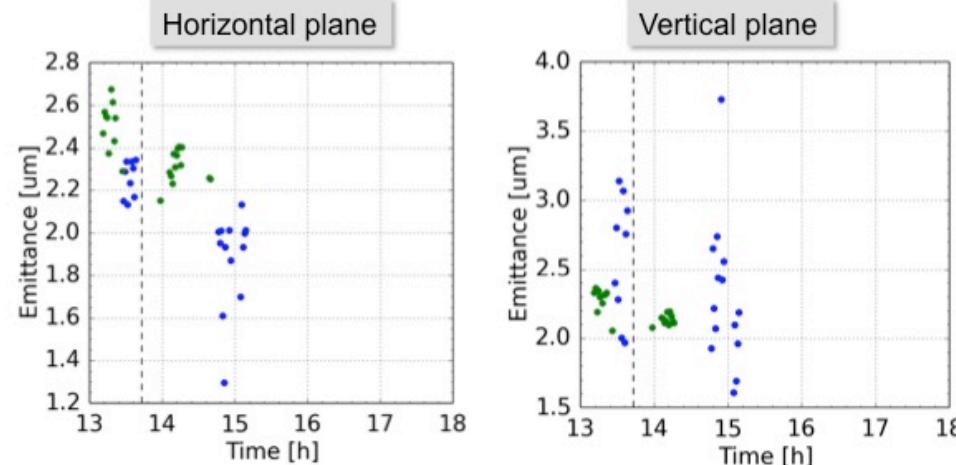
# Wirescanners

## ➤ Wire scan reliability

**Emittance nominal 25 ns ( $1.2 \times 10^{11}$  ppb): Results from MD on 23<sup>rd</sup> of September**

Normalized Emittance @ 26 GeV: 2.5  $\mu\text{m}$  H, 2.4  $\mu\text{m}$  V

10 % improvement possible: higher long. emittance from PSB, lower Q' in PS



Qualification of beams at the SPS flattop not evident.

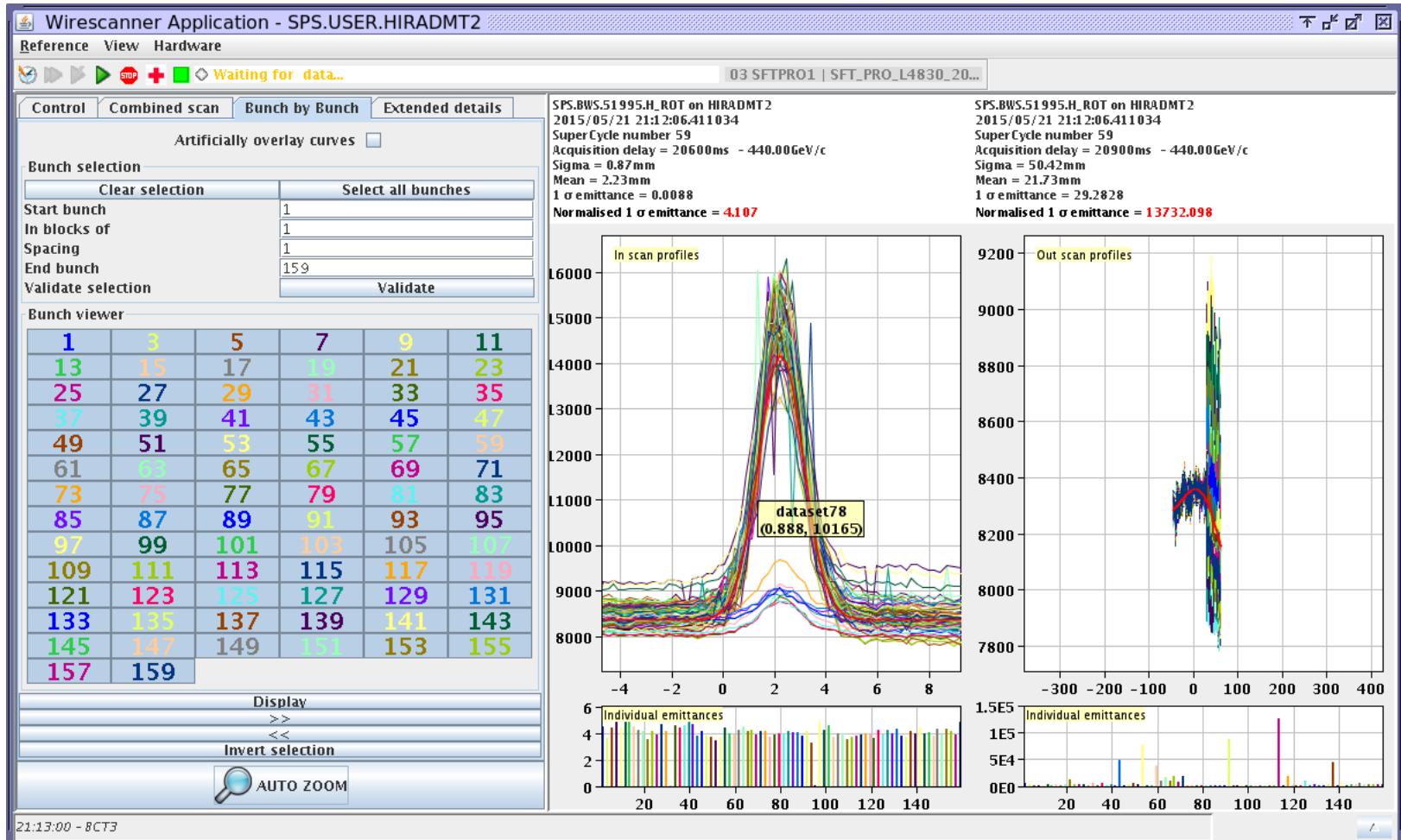
Emittance measurement not reliable.

Issue: absolute resolution of beam size similar at FB and FT.

- Measurements at Flat Bottom
- Measurements at Flat Top

# Wirescanners(2)

- Bunch by bunch measurements are now limited to 80 bunches:



# Requirements

## ➤ FBCT:

- Improve accuracy and Phase adjustment → values from FBCT and BCTDC do not correspond
- Ensure measurement for Ions with fixed frequency acceleration

## ➤ BCT:

- Ensure cross-calibration between different machines

## ➤ BLM:

- Diamond BLMs at LSS4 and LSS6 need to become operational  
→ FESA class needed

## ➤ BSRT:

- Available for operations  
→ Unable to measure emittance at Flat Top with high intensity beam

➤ MOPOS:

- Setting persistent when rebooting the FEC
  - the gate is changing to 30mm settings instead of staying in operational configuration

➤ Wirescanners:

- More modern electronics and front end without memory restrictions
  - to be able to measure bunch by bunch without limitations  
(now 80 bunches max.)
- New FESA class
  - less data treatment at application level (to be discussed with OP)
- Fitting/smoothing of the wire position readout data
- Prototype operational ASAP

# Outlook

- SEM grid essential for setting-up and to minimize losses
- BTV control is up to date and user friendly
- Several BPMs were in a bad state which have now been fixed
- Wirescanners highly solicited in 2015
- Cross-calibration of emittance measurements needed along the injector chain and the LHC
- BSRT strongly demanded

# Conclusion

Pending work in NA due to radiation levels

Not used devices still to be removed

Large amount of work done by BI to maintain the instrumentation

More MDs, more beams → more measurements

Intensive run to come and BI support is well appreciated

# Thank you for your attention