BI Day 2016 – Archamps

Thursday, 10 march 2016

Instrumentation Performance in the PS Complex in 2015 and wishes for the future

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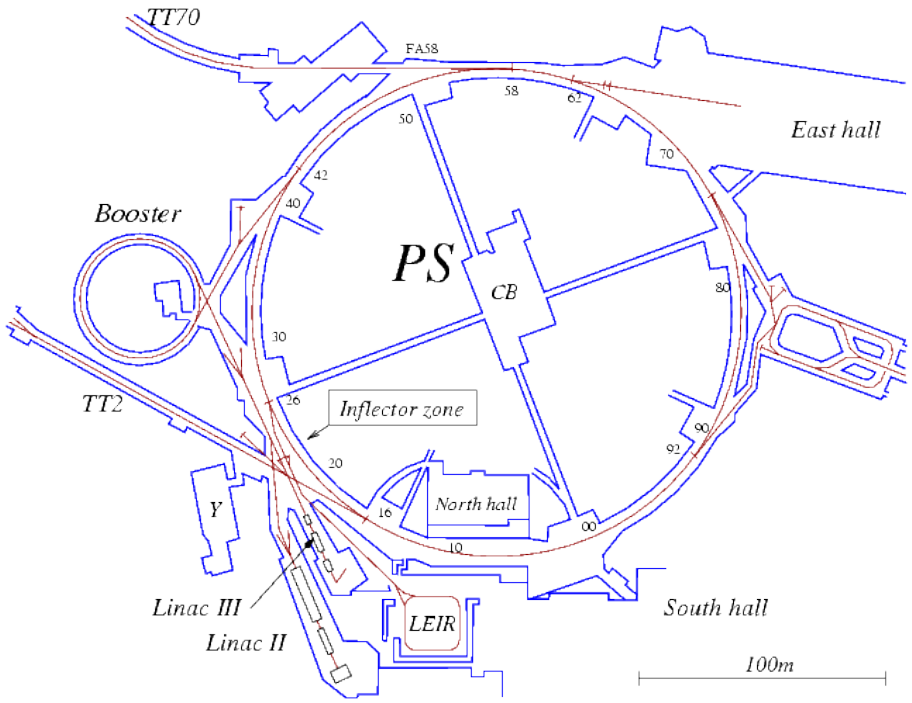
on behalf of CPS team

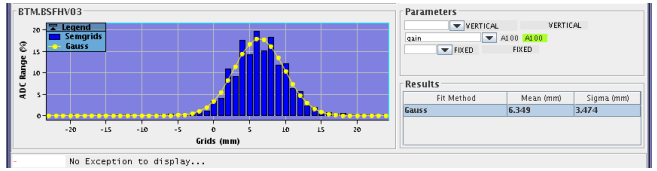
Outline

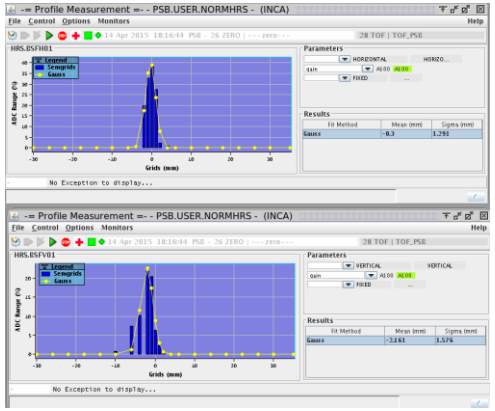
- An overview of the PSB instrumentation
  - Fast Wirescanners and SEMgrids
  - New Ring BLMs commissioning
  - Injection/Orbit/Ejection BPMs
  - Tune measurements
  - BTVs and BCTs
- An overview of the PS instrumentation
  - PS Orbit
  - Q measurement
  - Fast Wirescanners, SEMgrids/Fils
  - BLMs, BTVs and BCTs

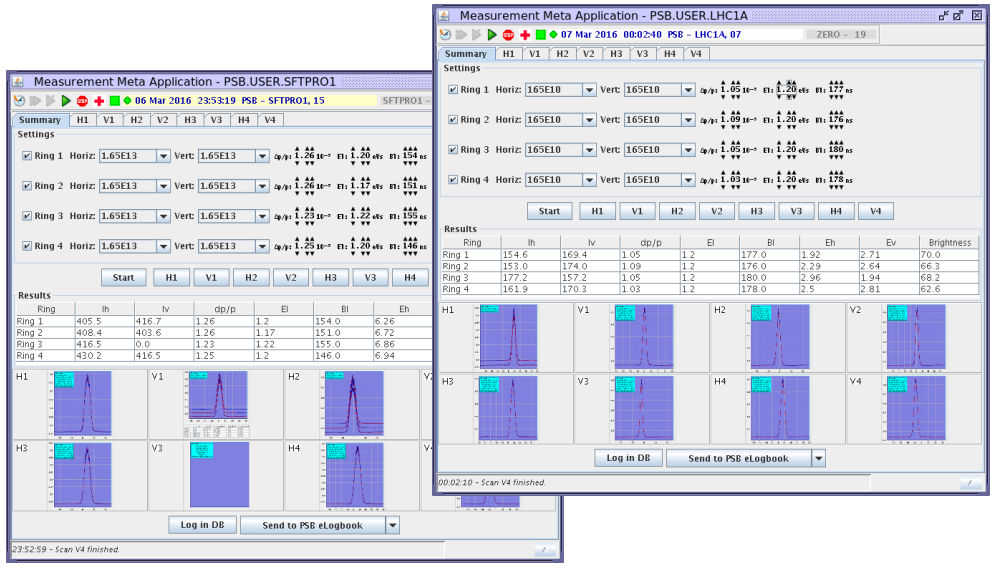


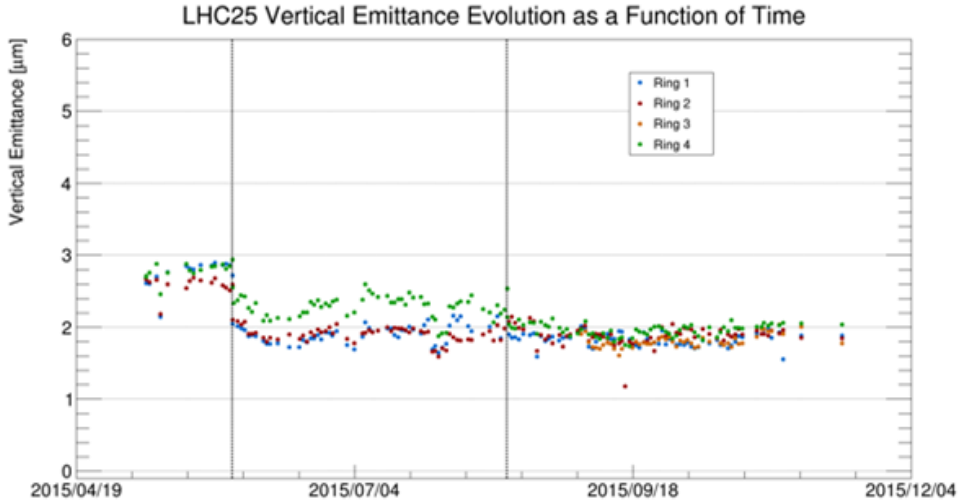
PS Booster: Fast Wirescanners & SEMgrids

- Intensive use for LHC daily measurements and MTE setting up/operation. We've done a lot of scans for all operational LHC beam (50ns/25ns) last year.
- 2 times wire broken - "resistance is too high" message -> good support availability and rapid solutions found.
- Large range of intensity measurements (e.g.: LHCPROBE (I ~5e09/ring) to NORMGPS (I < 1e13/ring)).
- SEMgrids still essential for setting-up in BTM and BTY/HRS/GPS. 3rd grid in BTM still not working correctly in vertical plane. Some defect channels for ISOLDE SEMgrids to be repaired.



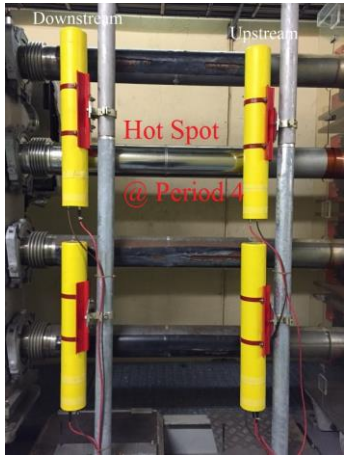






PS Booster: Ring BLMs #1

- 32 LHC type BLMs installed during LS1 commissioned in 2015:
  - 16 BLMs superior for ring 3 & 4.
  - 16 BLMs inferior for ring 1 & 2.
- 4 temporary BLMs provided and installed around period 4 for the "HOT SPOT" investigation. Ring 3 vacuum chamber replaced during YETS at that point.

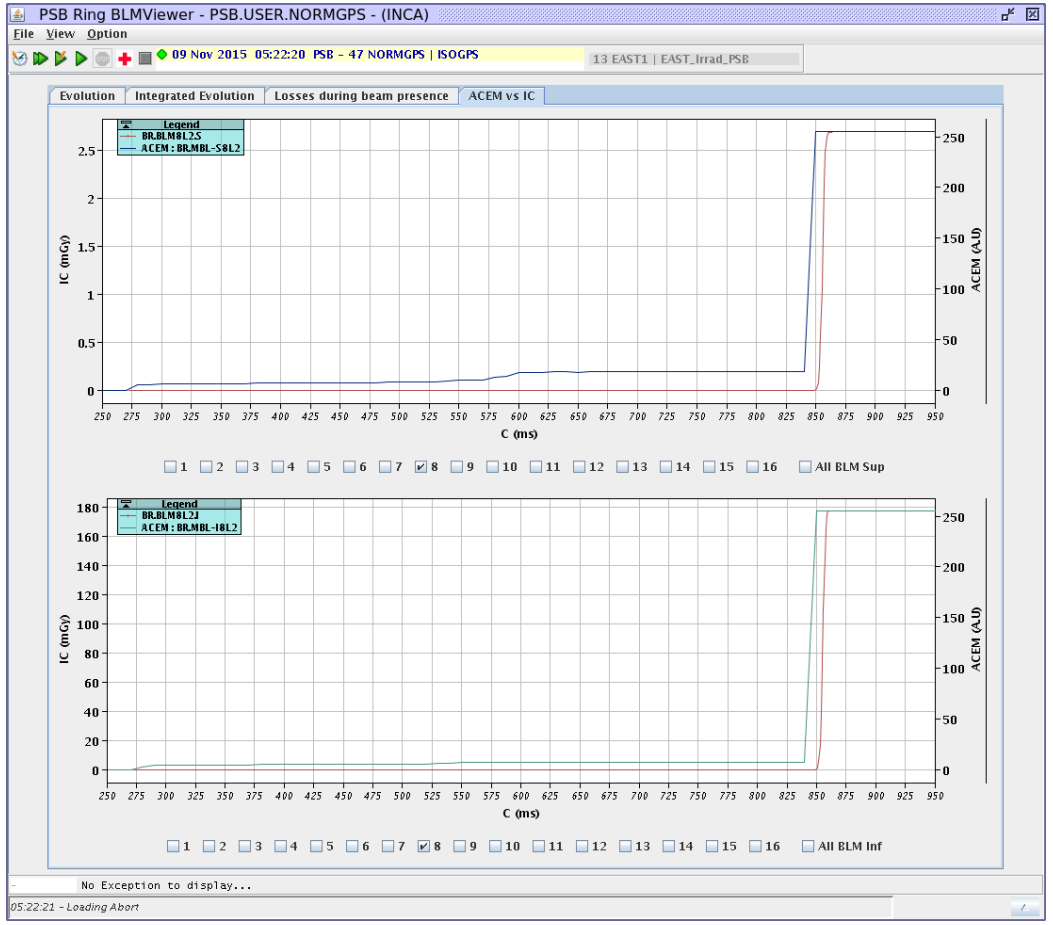


- User friendly GUI developed by PSB Operator (Y. WU) based on FESA3 class.

PS Booster: Ring BLMs #2

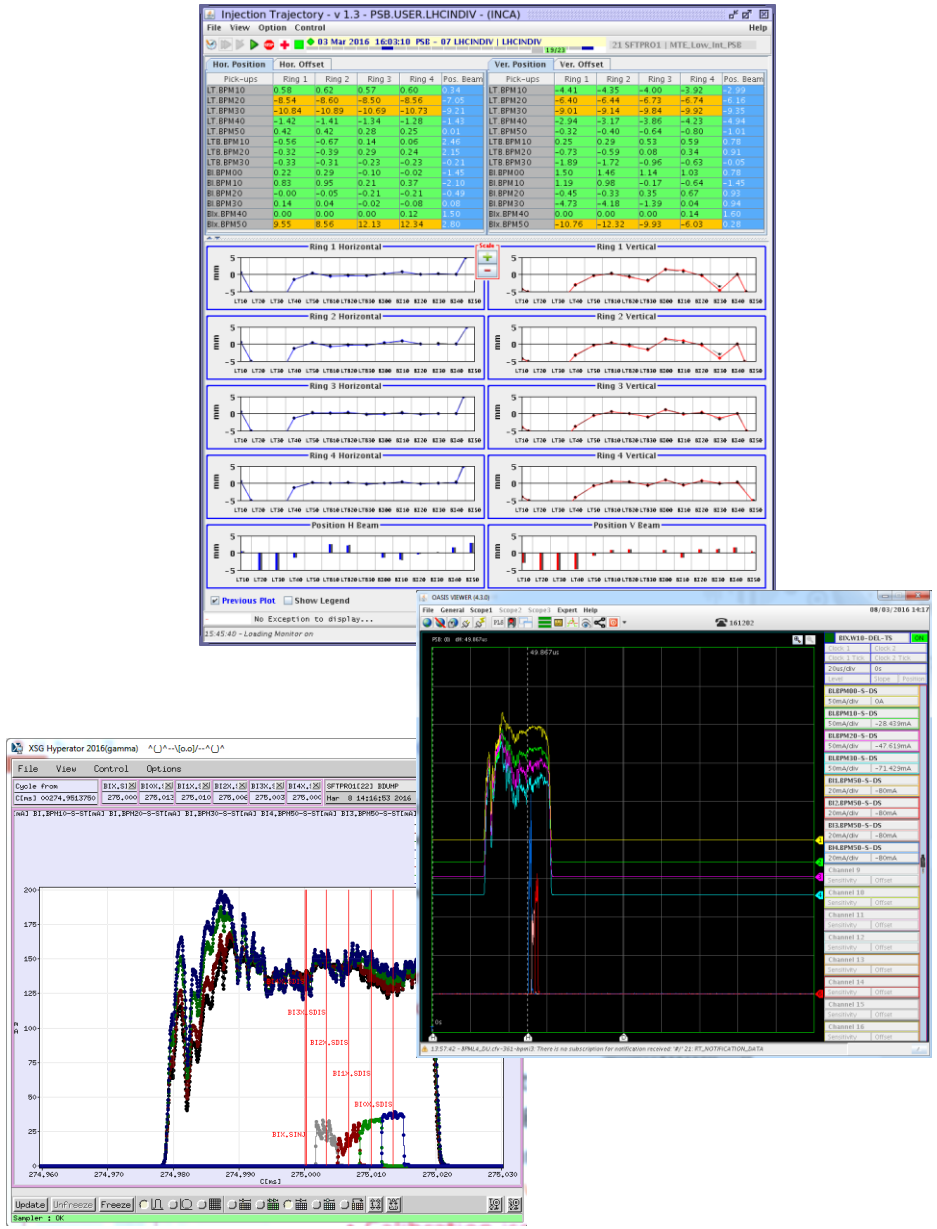
- ACEM and LHC type BLMs have similar loss detection pattern, even if LHC Type BLMs have a slower response : SLAC-PS-16057

- LHC type BLMs are less sensitive to particles lost at lower energy BUT provides more sensitivity for large losses while ACEMs are saturated.



PS Booster: Injection BPMs

- New Linac4 type BPMs installed during LS1
- Becoming better and better thanks to the experts debugging.
- FESA3 software deployed during the YETS 2015-16.
- Many MDs in 2015 to understand measured Beam Position fluctuations (BI.BPM30/40/50): Still under investigation.

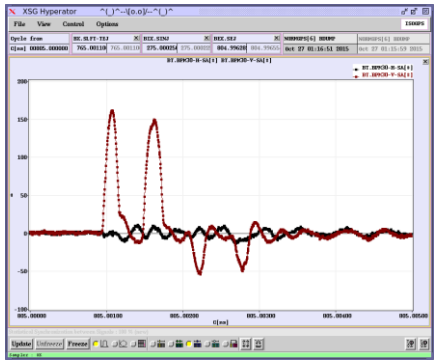


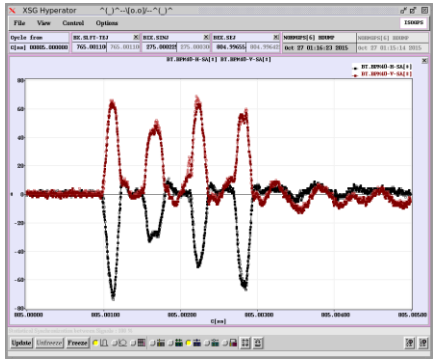
PS Booster: Orbit BPMs

- SW class for the Orbit still in FESA2 and works well
- New FESA3 BPMOGAIN for the gain control of the BPM07/08 and 11 on Ring 2. To be included in the operational application “ PSB Orbit Turn by Turn”.
- Many issues could be identified during MDs end of last year; dense commissioning program to be completed by end April 2016

PS Booster: Ejection BPMs

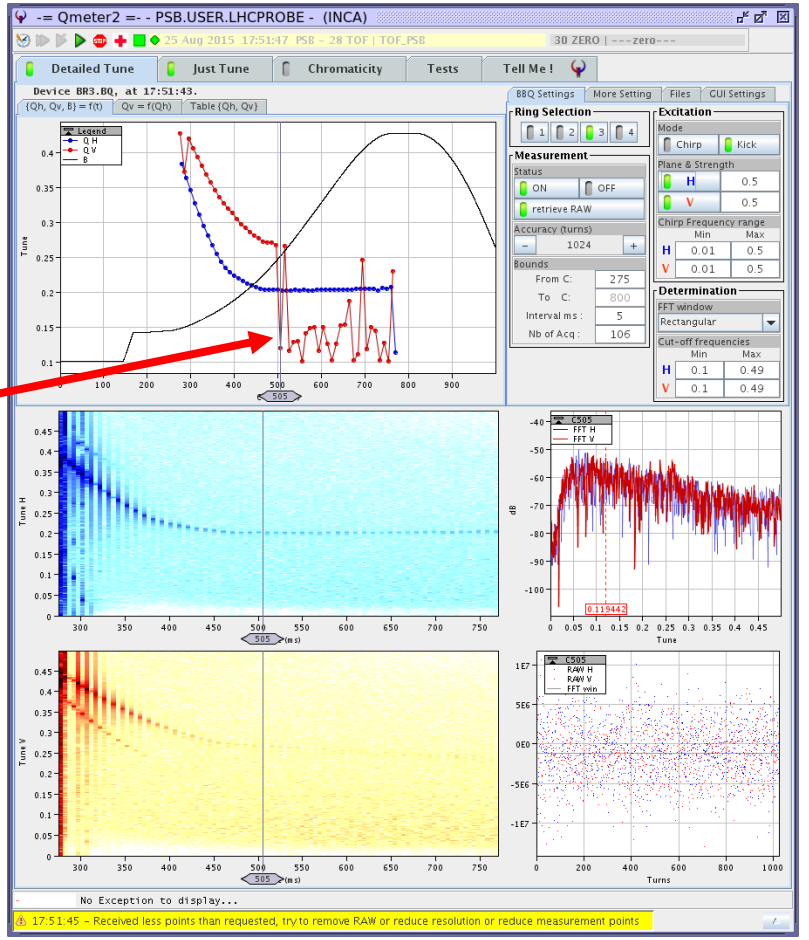
- The Ejection pick-ups are essential to provide good beam quality to our users (PS-ISOLDE), even if we've experienced some issues at the beginning of the last run.
- Investigations on the ringing problem are on-going.
- Droop issue and some additional HW problems solved during the YETS 2015-16.





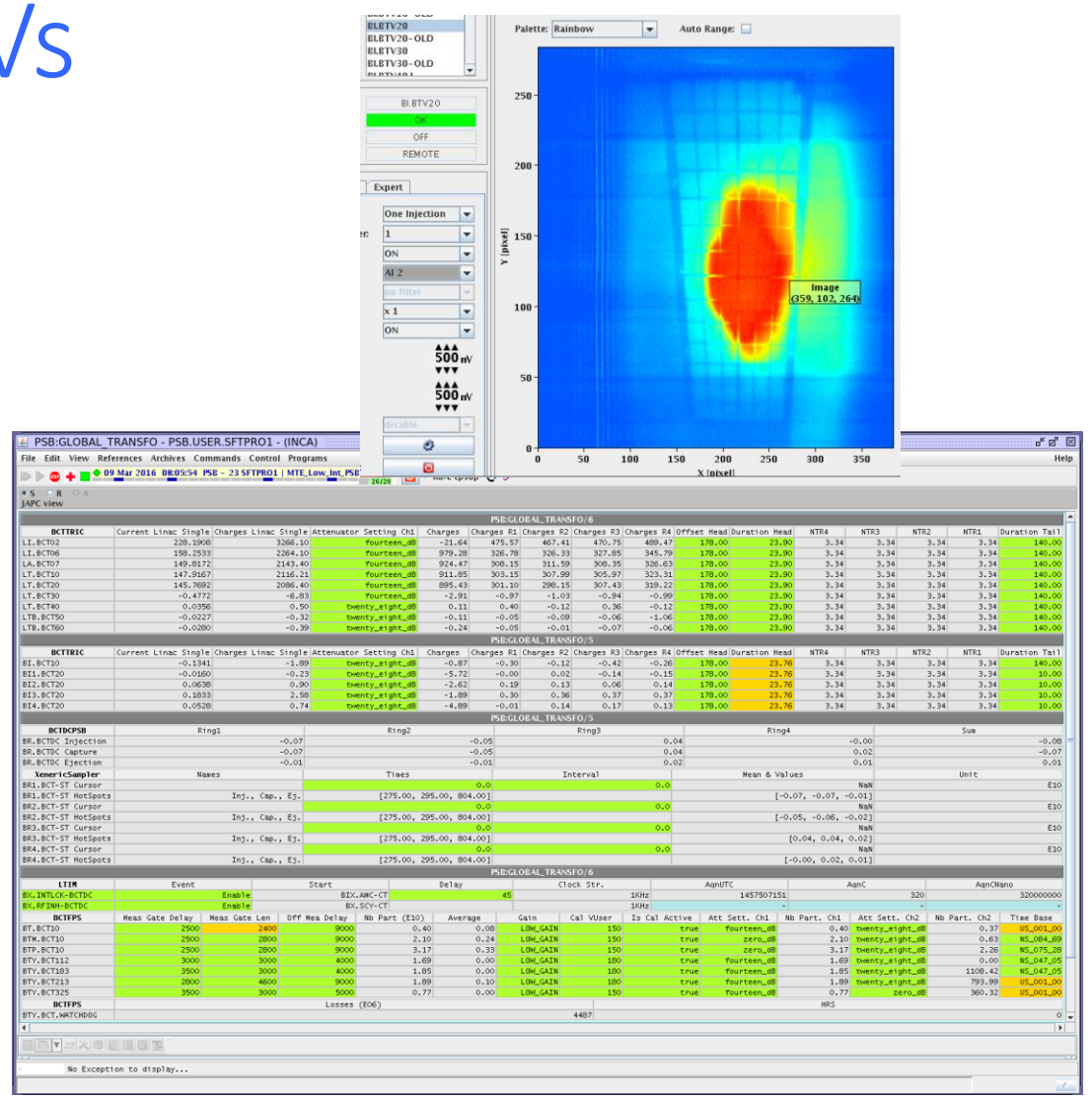
PS Booster: Tune Measurement

- New Tune pick-up is being designed (LIU-PSB), will hopefully replace the current one from EYETS.
- Tune for LHCPROBE beam (~5e9) cannot be measured;
- Even by increasing by 5 times the voltage of the kick.



PS Booster: BCTs and BTVs

- All BTVs in Booster worked well during 2015. Good support when any problem occurred (misalignment, broken lamp…). Requested calibration.
- Injection BCTs OK
- Ring BCTDC OK, small issues during 2015 run rapidly solved. Electronics on Ring 4 changed during 2016 HW test period.
- Ejection BCTs OK. BCT in BTM line has larger uncertainties.



PS instrumentation #1

PS – Trajectory and Orbit Measurement

- Works well and good availability, some difficulties remains when settings don't match current operation.

  -> OP need to have access to change Expert settings.

PS – Qmeas

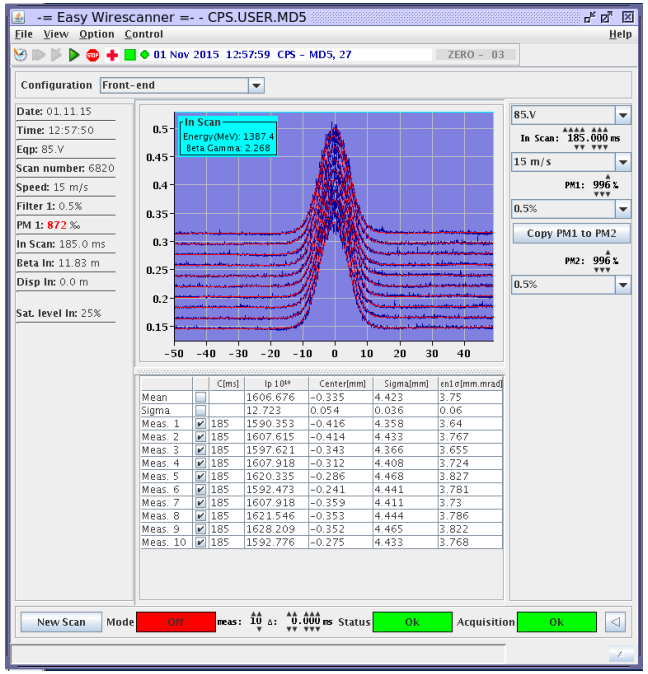
- Long PU was cabled in Quadrupolar mode at the end of last year to measure transverse quadrupolar Oscillation for space charge studies.
- We will stay in Quadrupolar mode in 2016 (Qmeas for ION beams not available but can be swiched back to normal).

PS – Semgrids/Fils

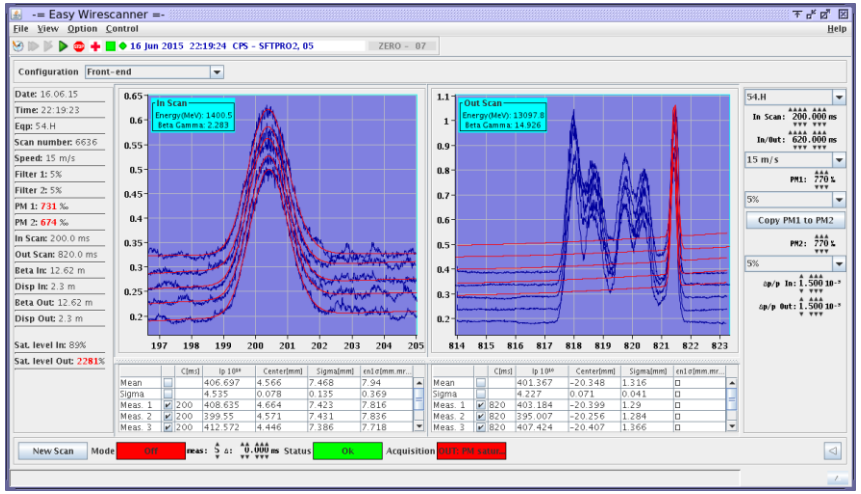
- Worked well during the 2015 run. (only issues on **PI.BSF42V** with disordered wires).
- **PI.BSF42** not usable for 2016 run. (8/48 wires broken) → Bake out issue – understood ?

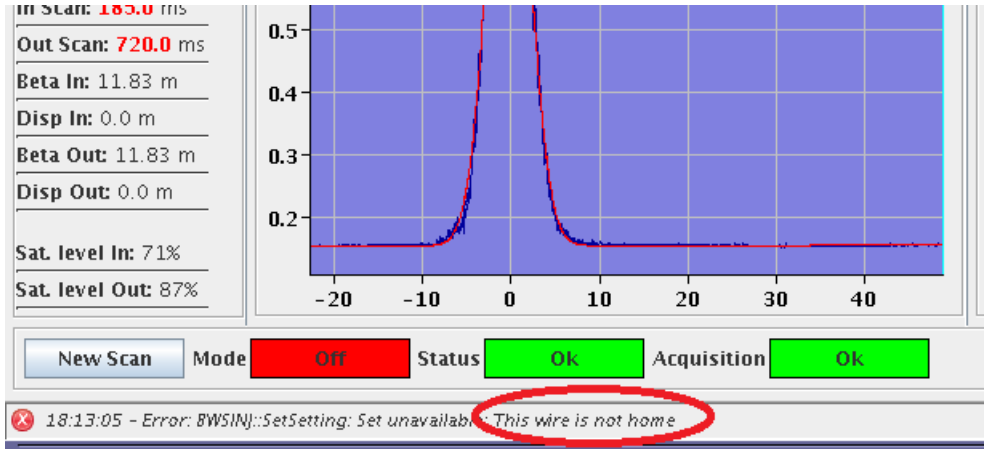
PS instrumentation #2

PS – Fast Wire Scanner measurements



- Intensive use during MTE setting-up/operation and systematic LHC measurements.
- Several times wire blocked “The wire is not home” -> good support availability
- LHCPROBE/INDIV (I ≤ 10e10). Not enough signal to measure at injection energy
- Bunch-by-bunch measurement done during MD on BSW68 by putting a local scope on the PM. We look forward to the future to have it operational.
- Requested to install new wire scanner proto-type in the PS before LS2 (EYETS), by replacing the BWS54.

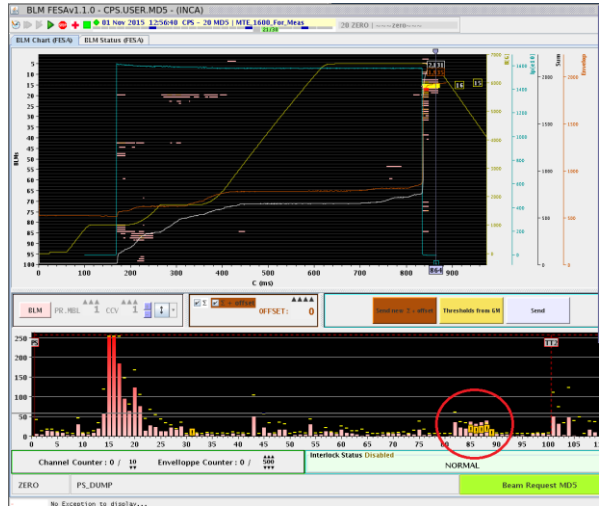




PS instrumentation #3

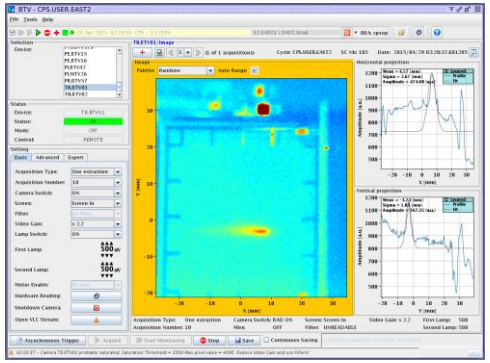
PS – Beam Loss Monitor

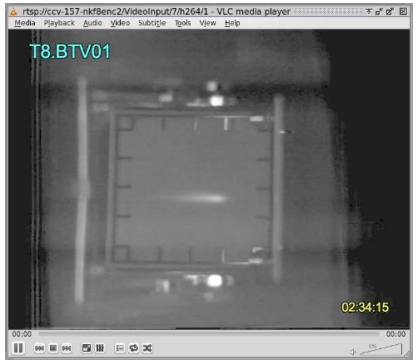
- Migration GM to FESA done in 2015 without any problem.
  (several BLM restart working around SS85-SS88 after the migration)
- Both version (GM & FESA) available during the tests.
- Old FEC dcpsblm switched OFF.



PS – BTV

- Very useful and works well all along 2015 run. A real advantage is the availability on VLC and VOS eradication.
- 2016 : looking forward to see beam on new East Area BTVs (F61)



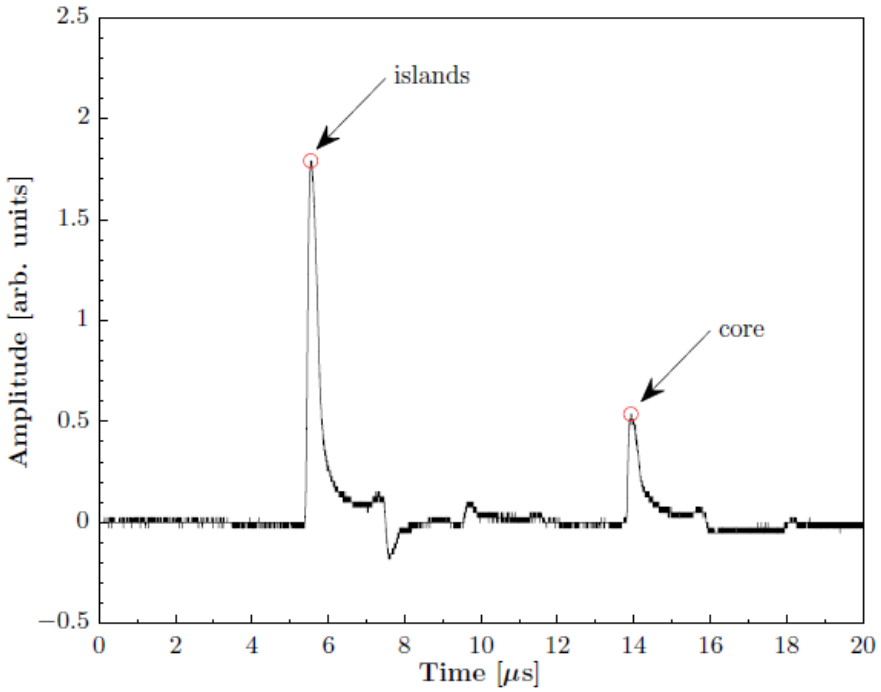


PS – BCT in SS38

- DC - 1000-turn transformer should be operational in 2016.
- To be commissioned.
- Very important tool to optimize the injection transmission

PS instrumentation #4

- **Transformers DC**: New mechanism to manage the Base Line Restitution (Good improvement for low intensity beams).
- **2 new WCMs**: 1 added and 1 changed during YETS. Need to be commissioned as soon as we get beam in the PS.
- **Fast BLMs**: Extraction 15/16 and Injection 42: permit to diagnose losses internal to the bunch structure.



Thanks to the BI team for their good collaboration. They are always welcome in the CPS island for common MDs or discussions.

Special thanks for having provided information to:
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A. Guerrero, S. Bart Pedersen.

THANS FOR YOUR ATTENTION!