Beam instrumentation throughout the accelerator complex: prospects for 2009

JJ Gras on behalf of BE/BI

- BI organization
- What's new for 2009 in the different facilities
- What would be the impact on instrumentation without a shutdown 2009-10

BE/BI Organization - Management

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

Red means Changes

- GL Rhodri Jones
- DGL J-J Gras (responsible for BI Technical Coordination)
- BI Sections:
  - BL Beam Loss Monitors — Bernd Dehning
  - EA Experimental Areas — Jens Spanggaard
  - ML Mechanics and Logistics — Gerard Tranquille
  - PI Position (CPS) and Intensity — Lars Soby
  - PM Profile Measurements — Enrico Bravin
  - QP Tune and Position (SPS/LHC) — Uli Raich
  - SW Software — Lars Jensen

2009 BI Prospects for Linac 2

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- Nothing new for start-up

- Plans for 2009 run:
  - We plan to upgrade **fast current transformers electronics** on the entire PS complex in 4 steps.
    - Assess the new electronics on some PSB and PS channels (start-up).
    - Install the new electronics in // with the old ones on the other fast transformers (during the year)
    - Check them with OP and swap operational devices (during the year)
    - Eliminate old electronics (before 2010 SU).
  - Watchdog renovation by CO in collaboration with BI is ongoing (current system relies on GM, new one will be based on SIS). It should be assessed during the run.

2009 BI Prospects for PSB

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- New for start-up
  - Fast wire scanners: All re-calibrated with renovated HW and SW and re-installed. Filter boxes have been added. 2008 bellows remain and are supposed to be exchanged next SD. Currently under HW commissioning within BI.
  - Orbit system upgrade: Both planes of the existing BPM are now cabled. One prototype multiplexer is installed for software upgrade and testing. 20 MPX are in production to be installed mid March.
  - Fast current transformer acquisition electronics renovation: new electronics has been installed on 3 systems (for BTP.TRA, BTM.TRA and BT.TRA112) in // with the old one for 2009 start-up
  - SEM grid software upgrade: SEM grid SW is upgraded based on LEIR version for standardization over the injectors . Ready for cold check out.
  - All BLMs have been tested and calibrated. Ready for cold check out.
  - GM backward compatibility is now disabled for all BCTs. We hope and will push to reach the same state with BPM during the run.

2009 BI Prospects for PS

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- New for start-up
  - Fast wire scanners: All re-calibrated with renovated HW and SW and re-installed. All bellows have been exchanged. Currently under HW commissioning within BI.
  - New PS Orbit System: Existing CODD + ABS remains primary system for 2009 start-up. New system will be available in // for commissioning. We will swap as soon as YASP is is configured and operational on the new system for all USERs. We will work on this with OP/ABP/CO from start-up on to make this happen in 2009.
  - SEM grid software upgrade: injection line SEM grid SW is upgraded based on LEIR version for standardization over the injectors. Ready for cold check out. For TT2, it will be prepared but only deployed if CO manages to integrate them in YASP for the start-up. (The original plan was to do that together with TT2/TT10 BPM renovation next SD).
  - 2 new BTVs (OTR) are installed on TT2 and ready for cold check out (F16.MTV229, F16.MTV241)
  - Fast current transformer acquisition electronics renovation: new electronics has been installed on 1 systems (for MTE FTA.212) in // with the old one.
  - All BLMs have been tested and calibrated
- Plans for 2009 run
  - 6 turn transformer renovation: System will be ready for test this Summer. Current dedicated BCT and the WCM03 will be equipped and acquired. OP still has to provide the dedicated OP GUI. Till then, we'll use the expert one.

2009 BI Prospects for SPS

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- New for the start-up
  - TI2/8 additional BPM planes and pick-ups: TI8 in progress, will be operational for start-up. TI2 upgrade is planned for next **real** shutdown.
  - BWS software interface upgrade: On purpose broken wires have been replaced. Like agreed in APC, we did not renovate electronics this shutdown but we plan to change old front end software to mimic the new interface allowing usage of Elliot's OP GUI over the entire complex. To be HW commissioned. 517 hardware problem is still to be investigated.
  - The point 1 BCTDC has been exchanged. Old one was dead, probably due to radiation. Tests in progress.
  - Renovation of the SEM stepping motor movements for LSS2: ready for start-up. We should migrate the rest during the year (current control on Nodal is not reliable). To be discussed in due time.

2009 BI Prospects for SPS

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- Plans for 2009 run:
  - Both new BPM interlock prototypes (bump extraction and 30 mm H/V excursion) will be tested during 2009
  - Replacement of the current MIL1553 BTV electronics: We will be ready by the end of 2009 and we plan to do it then. To be discussed in due time

- Pending Issues:
  - As discussed in APC, the SPS IPM electronics and camera upgrade had to be delayed until next shutdown. SPS IPM will not be operational this year.
  - Replaced cables in BA2 (BLM and BPM) still have to be checked. Campaign will start in the coming weeks.

2009 BI Prospects for Linac 3 & LEIR

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- New for start-up
  - Front end software upgrade to FESA 2.10 version. In progress.
  - EN/STI took over collimators and scrapers responsibility.
  - LEIR tune measurement will be based on the BBQ system.
- Plans for 2009 run
  - We plan also to eventually upgrade fast current transformers electronics there based on PSB and PS results.
  - The LEIR IPM will remain controlled via remote desktop of dedicated PC.

2009 BI Prospects for AD

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- New for start-up
  - Replacement of PMT for Emittance measurement based on scrapers will be done for start-up.

- Plans for 2009 run
  - The current Schottky system will remain as is in 2009. It has been agreed with RF that they will eventually take completely over the longitudinal measurements (including intensity) as part of the RF system renovation.
    BI will look at the signal coming from the actual transverse pickup to propose a solution for tune measurement for 2010.
  - *NEW*: Dogleg MTV sensitivity issue will be locked at.

2009 BI Prospects for EA East & North

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- New for start-up
  - New acquisition system (HW and SW) for MWPC in the North Area is in progress.
  - Target Absorber and Collimators responsibility transferred to EN-STI.

- Nothing foreseen on East Areas in 2009. Work will start in 2010 on SEC and Telescope consolidation

2009 BI Prospects for ISOLDE

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- New for start-up
  - New Tapestation installed. New FESA front end software has been deployed with BI Expert application.
  - ISOLDE integrators for RP are now fully integrated in BCT front end SW (GM legacy part has been eliminated).

- New during the run
  - Fast current transformer electronics renovation will include ISOLDE watch dog: We could take this opportunity to review its functionality if necessary.

2009 BI Prospects for REX

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- Nothing new for Start-Up
- Plans for 2009 run
  - We will replace the instrumentation control hardware during the run. We'll do everything we can to keep the old SW interface as much as possible. To be discussed in due time.

2009 BI Prospects for CTF3

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- New for Start-Up
  - 2 New BTVs are installed and ready in TL2.
  - Recurrent problem with station “Mars” readout has been solved by LAPP. FE-software problems with Pc-Gateway crashing is still under investigation in CO but some bugs have been found
  - BI will provide first line support for BPM system.
- New during 2009
  - Sometime during the year, MIDI stepping motors will be replaced by PLC. Corresponding Knobs will have to be updated.
  - 1 new RF pick-up for bunch length monitoring will be added in the CLEX areas
  - 1 new phase monitor for bunch combination monitoring will be added in the transfer line 1 (TL1)
  - Two BTV's (spectrometer line and emittance measurement) will be designed and built for the Test beam line in CLEX

BI and no 2009-10 Shutdown

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- In case of no shutdown 2009-10, we will not be able to:
  - recalibrate all PS complex wire scanners
  - exchange all PSB wire-scanners bellows which will approach their limit end of 2009, i.e. ~7k scans for an estimated lifetime of ~10k. If there is a bellows failure, 1 day access is needed to replace the tank with our spare.
  - change the PS WS tanks (larger windows and aperture on horizontal plane) for proper MTE operation. No consequence on LHC operation but would hinder progress with the MTE in 2010.
  - All the above would fit in ~1 month.
  - Repair broken wire scanner wires (mainly PSB and PS). The vacuum needs to be opened to repair and scanner re-calibrate. 1 day access is needed to replace one WS with our spare. Could be a technical stop.

BI and no 2009-10 Shutdown

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- In case of no shutdown 2009-10, we will not be able to:
  - Recalibrate CPS BLM monitors. This takes ~3 weeks. This year, about 5 % of the monitors were replaced and the gain of about 30 % of monitors was readjusted. If the requirements are changed it is possible to replace only the broken monitors in a short stop
  - Replace 10 BPMs in the Booster to PS transfer line and two in the Isolde line. We would need 4 weeks to ensure this installation.
  - Do the annual maintenance of the PS orbit head electronics. This normally takes 3-4 weeks. Not really serious but we could expect more down time during the run.

BI and no 2009-10 Shutdown

BI Org – Prospects (L2 – PSB – PS – SPS – L3 – LEIR – AD – EA – ISOLDE – REX – CTF3) – No SD

- In case of no shutdown 2009-10, we will not be able to:
  - install and commission new electronics and software for TT2/TT10 BPM. Installation would take 3-4 weeks but commissioning with beam of the entirely new system will add some time.

ATOP: Beam Instrumentation
Conclusions

- Our initial prospects are on track.

- We'll need dedicated beam time to commission all the new items (CPS wire scanners, PS Orbit, new BCT…). I'll organize this effort on BI side but we again count on your (OP/ABP) help and support there like we did end of last year to achieve our objectives as soon as possible.

- We gave our first evaluation of the impact of a long LHC run and would advise for a few weeks short stop just after Christmas holiday for **targeted** maintenance and repairs.

- This information will be published in details in the 2009 BI newsletter as soon as BI representatives to new committees and WG will be defined.