

RF and ADT 2012 commissioning

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1 Work during winter shutdown

2 RF 2012 commissioning

3 ADT

Work during winter shutdown

High Level RF

- Four klystrons (M2B1) have been modified to support 500 kW DC
 - Similar work to M1B2 last year
- The last 8 LEP type Drivers have been replaced by new ones so that now they are all new
- All LEP type focus power supplies have also been replaced by new ones

LLRF

- Most SMC cables in Faraday cage were replaced (at least 200), we want to make sure this process did not introduce any errors (access to UX45 might be necessary)
- A dedicated bunch-per-bunch phase measurement was installed in the Faraday cage (UX45): reduce temperature dependence
 - System was connected to PU and Cavity Sum by 350 m long cables previously

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RF 2012 commissioning

Business as usual:

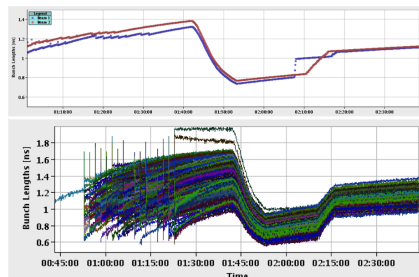
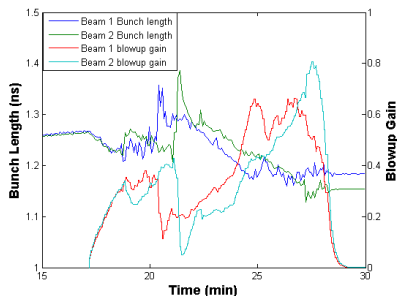
- Cavity conditioning, powering tests (started last Wednesday). Accesses will be necessary
- LLRF re-commissioning
 - One-turn Feedback added to commissioning sequence. Already commissioned in October 2011 though and operated for two months
- Cavity phasing with beam (4 hours)

What's new:

- New longitudinal emittance blowup. Prepare for batch-by-batch blowup
- Bunch Length Choice. Develop/Implement Bunch Length Leveling?
- A new FESA class will be installed, which will control at each injection the 3 phases for the incoming batch: longitudinal damping, batch blow-up, inclusion in the main phase loop. Debugging will be necessary

New longitudinal emittance blowup

Why are we upgrading?



- Smoother, better controlled blowup. May help with heating issues (to be studied)
- More functionalities → allow the implementation of batch-by-batch blowup at injection
 - Help reduce transverse emittance increase at 450 GeV due to IBS (essential with SPS Q20 optics)

Bunch Length

- Our understanding is that there are two structures with heating correlated to bunch length
 - Beam screens: sufficient margin
 - MKI: marginal dependence on bunch length over the range of possible values
- Negative consequences of increase: luminosity reduction due to the geometric factor, increased beam loss ("effective" bucket at about 1.4 ns in physics)
- We suggest starting with 1.25 ns (2011 operation), and once we reach stable operation test a couple of fills at ± 100 ps to see the effect on heating and luminosity
- Bunch Length Leveling
 - Currently we have 12 MV in physics. Could go up to 16 MV (B1), 15 MV (B2), but with increased risk of tripping
 - Room for 7.5% (B1), 6% (B2) reduction in σ_z – less than 100 ps
 - Could consider smaller emittance at end of ramp, smaller voltage at start of physics

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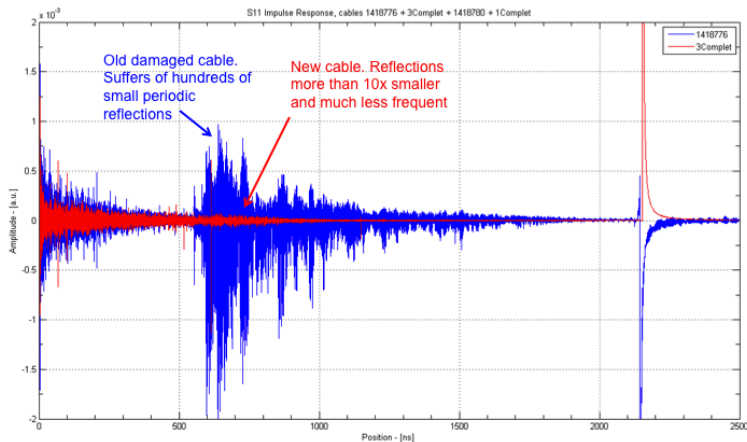
ADT

Planned for TS 2011

- Loss maps and controlled blow-up using the ADT
 - Firmware in place, the user interface is being prepared
- Feasibility study for Q measurement using the ADT data - Witness bunches method
 - The firmware is being prepared
- ADT gain modulation within turn
 - Firmware ready
- Preparation for complete recabling in LS1 (>20km of 7/8" smooth-wall coaxial cable)
 - Pickup cables of Horizontal Beam 2 unit were replaced this technical stop

New cables

- Newly installed pickup cables have much cleaner impulse response which should reduce noise in the Beam Position measurement



ADT re-commissioning after the TS

- Validation of the new firmware (gain modulation within the turn), requires revalidation of the abort gap and injection cleaning MCS parameters (2-4 hours)
 - Mandatory, significant changes in the firmware introduced
- Commissioning of the recabled system HB2: 4 hours
 - Mandatory, otherwise system HB2 not operational
- Verification of the loop parameters (phasing, delay): 6 hours.
 - Mandatory annual system check up with beam
- Intensity settings for 1.4 and 1.7e11 ppb: 2x4 hours
 - If not done running above 1.4e11ppb not possible
- Commissioning of the blow-up for loss maps: 8 hours (min)
 - User interface being prepared (Delphine), functionality requested by the OP
- Automatic gain adjustment (pilot/nominal): if ready in the sequencer
 - Requires modification of the LHC sequencer (Delphine), if time allows

Re-commissioning after the TS: total 3-4 shifts, preferably not consecutive