Report on RF ramping session 13.11.09

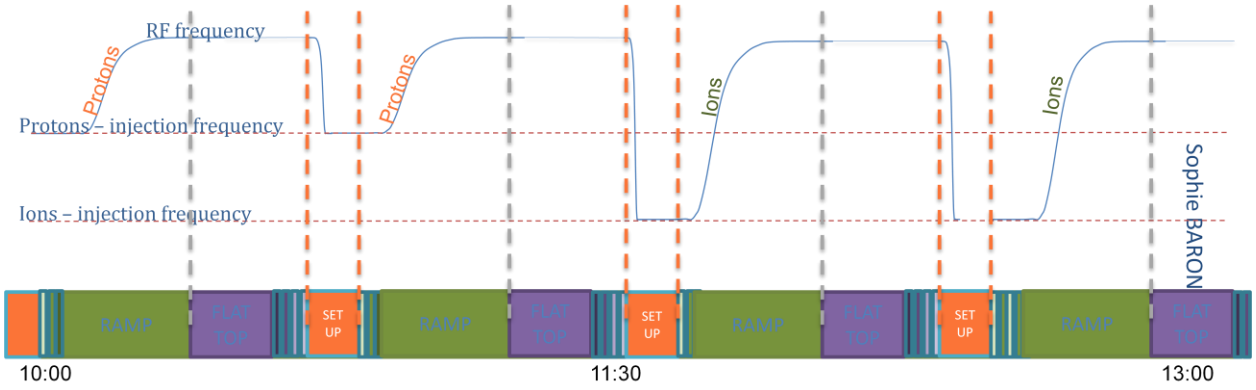
Program

8:00 – 10:00 – RAMPS for RF

_ Ramps dedicated to RF tests (phase noise measurement during ramp to test a new firmware)
_ Cycles focused on RAMP, so we plan to do as many RAMPs as possible within 2 hours
_ Protons cycles only, identical program for both beams
_ No sequence, only tasks:
    _ RF down to injection value (dF/dt = 10000 Hz/s)
    _ RF resync
    _ No delay
    _ RAMP 7 TeV (28mn)
_ TOTAL cycle time = 30mn (we should fit 4 Proton ramps within the 2 first hours)
_ No guaranty in term of wild resync and cycle interruptions
_ Still, information will be provided on LHCpage1
_ During this period, experiments are advised to remain in internal clock

10:00 – 13:00 – RAMPS for EXP

__ Cycles as realist as possible, but still trying to optimize time spent on RAMP studies and on RF events
__ Protons and ions cycles
__ Typical sequence:
    __ SETUP (about 5mn)
        __ Frev source check (?)
        __ RF Prog 1 and 2 down to injection value
        __ RF resync
    __ INJECTION PROBE BEAM, INJECTION SETUP BEAM, INJECTION PHYSICS BEAM, PREP RAMP (10s each)
    __ RAMP (28mn)
    __ FLAT TOP (10mn) - Request from ALICE ,
    __ ADJUST, STABLE BEAMS, UNSTABLE BEAMS, BEAM DUMP, RAMP DOWN, CYCLING (10s each)
_ TOTAL cycle time 45mn
_ We should fit 4 cycles within 3 hours – 2 protons + 2 ions
_ Strong variations of RF reserved for SETUP
_ Final frequencies will be communicated before the ramps
_ BCref will be provided for frequency reference at 7TeV
_ Information will be updated on the LHCpage1



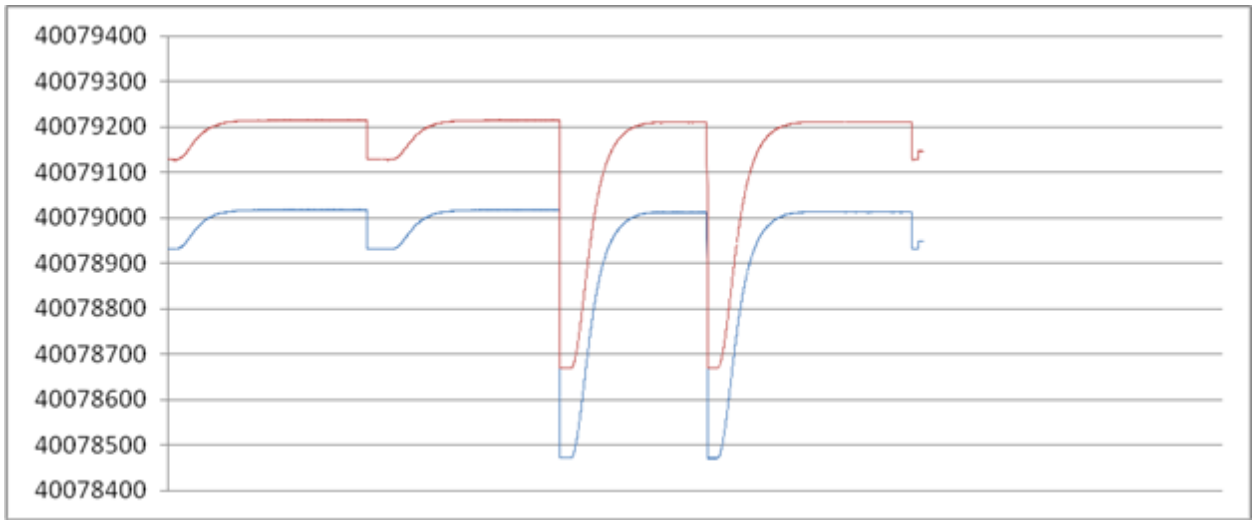
Report from CCC (S. Baron)

The tests started at 10:48 this morning and lasted less than 3 hours.
We performed 2 proton ramps (injection freq: 40.0788783, top frequency: 40.0789647) then, at 12:14, we started ion ramps.
For these ion ramps, the programmed frequencies were inj: 40.0784187, top: 40.0789628, but, in order to perform 2 ion ramps, we shortened the ramps by stopping them before reaching the top frequency. Thus the top frequency of the first ion sequence was 40.0789590MHz and the second was 40.0789601MHz.
You can see below a plot of the full test session.

Please note also that during top, the sequence changed a bit following a Totem request, and we got:
-FLAT TOP (***5mn***),
-ADJUST (10s)
-STABLE BEAMS (***5mn***)
-UNSTABLE BEAM (10s)

As promised (and on request from CMS), no resync was applied during SETUP. The rate of the Freq dump PLP was changed at 12:00 from 1000Hz/s down to 500Hz/s for the 400MHz RF, which makes the transitions last about 2 seconds for proton freq to go down to injection, and about 10 seconds for ions.

We checked the BC1 vs BC2 skew after this modification, which is just increasing from 15ps rms to 60ps during the dump, and then back. The RF synchro loop did not lose the lock and its error was kept minimal.



Report from RF

No phase noise added by the new firmware. Slowing down the 'di/dt' rate of the PLP (=df/dt in our case) from 1000Hz/s to 500Hz/s allowed to minimize the error of the synchro loop and to reduce jitter between BC1 and BC2 during the dump.

Report from Experiments

ALICE (A. Jusko)

As before, we were using local clock, after SETUP phase we changed to BEAM1, started run at the end of ramp.
We stopped run at the end of flat phase and went back to the LOCAL clock.
We start run at the end of ramp, no problem with clock BEAM1, neither with the transitions between LOCAL/BEAM1 clocks.
Now, all our subdetectors using QPLL were involved -in total we had 140 + 20 + 1 QPLL.
It was usefull -we tested the whole cycle of changing the clock 4 times.

ATLAS (T. Pauly)

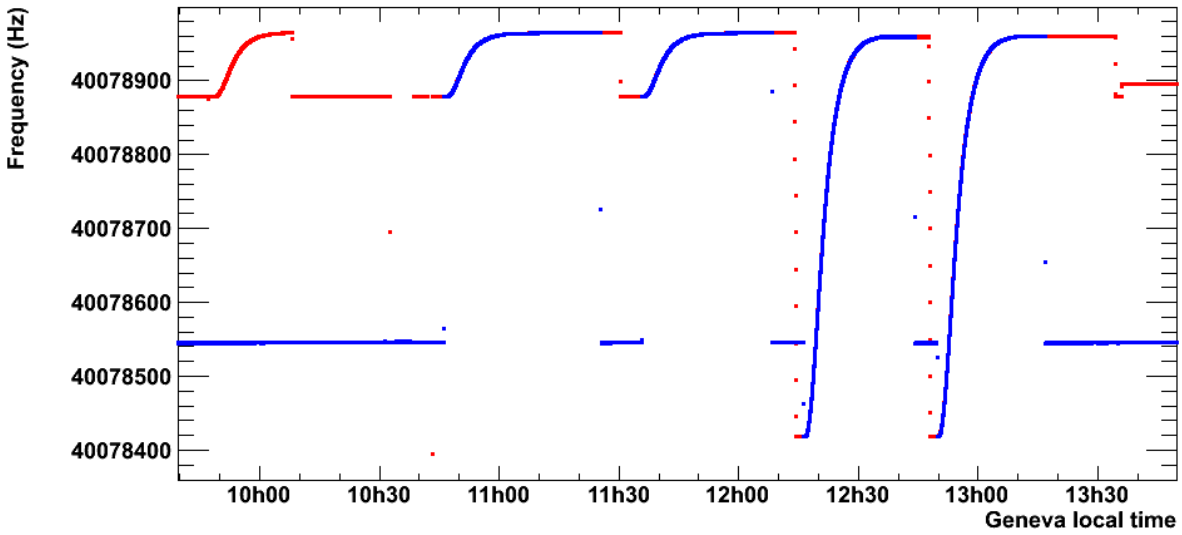
The tests today were very successful for ATLAS.

The major purpose was to

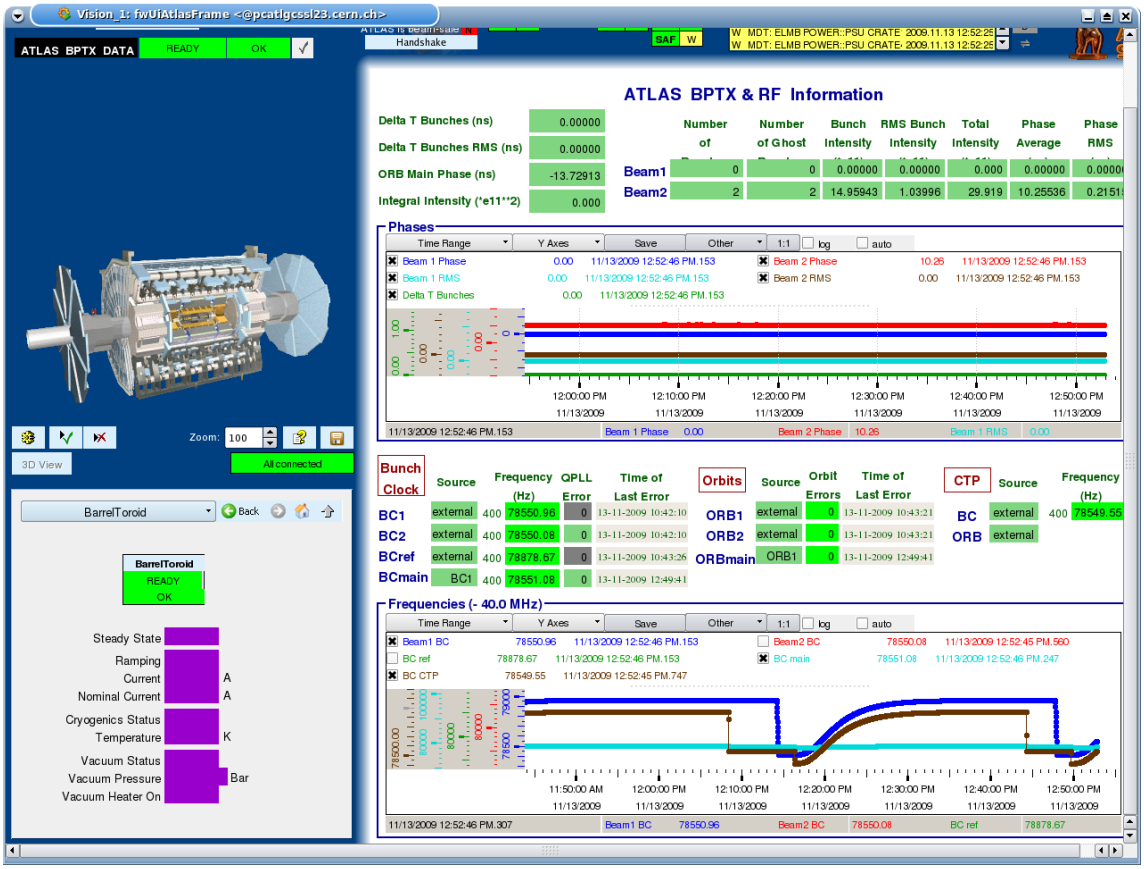
a) test the procedure of clock switching (still manually, with manually inhibiting triggers)

b) test a new brute-force QPLL reset for the TGC (forward trigger muon chambers). During configuration, when everybody resets with the RF2TTC internal frequency, they first switch locally to a 39MHz clock to be sure to unlock every single one of their QPLLs, before they relock again. This seemed to have worked wonders for them, because after this we did not see any errors from anymore from the TGC.

The result is very good, at least so far: no errors were found and we nicely survived all clock switches and ramps while the whole detector (I don't know how many QPLLs, but >1000 is a safe bet) was read out at 30 kHz. There is still a little concern (and controversy within LAr) as to whether the LAr could experience a phase shift of 6ns due to a QPLL unlock, but this they can only confirm with beam ... to be watched.

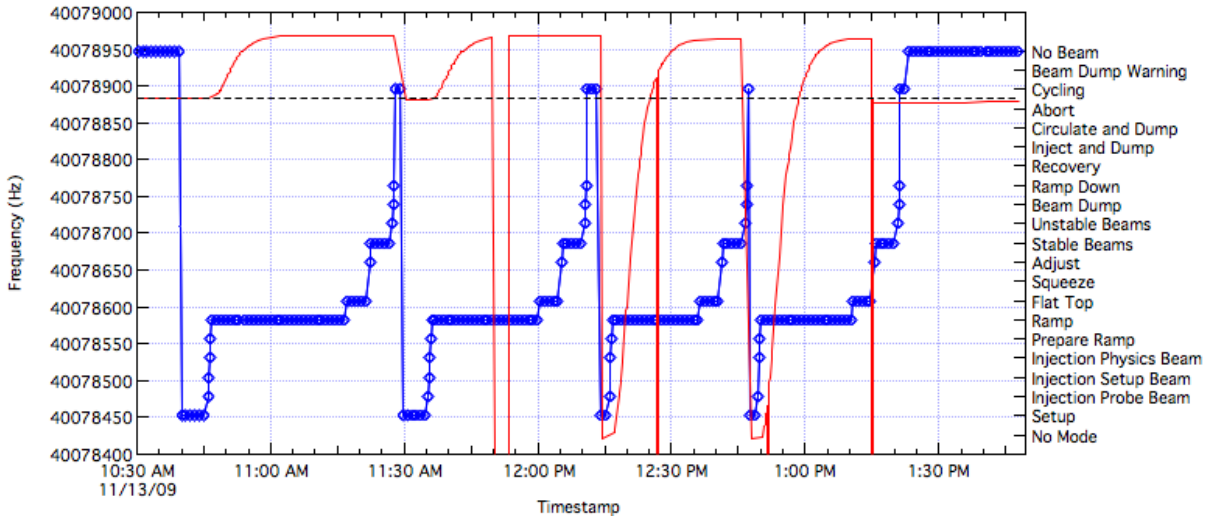


we have now our frequencies on DCS, which I guess you should be able to look at over the web, in case you are interested. It is still at a very early stage, in particular the time-trend Y-scale needs to be improved. But the frequncies and QPLL and ORBIT errors are shown.



CMS (J. Troska)

CMS was just in the process of starting the detector from shutdown. This started at 7:00 and the full process took about 6h. Each start of a run is materialized on the graph below by a resync of the RF2TTC module (straight red line touching the x-axis). 4 attempts were actually made during the RF ramping session. Only the last one ended with actual data taking, which started at about 1:00 PM (following the end of the last ion ramp).



During internal ramp sessions previously made, it has been confirmed that the Ecal and MuonDT Detectors (the 2 main detectors equipped with QPLL) are losing lock during the ramps (protons and ions). This is probably due to a bad startup procedure (with a wrong input frequency), and this will be solved in the future.

Anyway, CMS has now put in place a light procedure to recover the sync of sub-systems losing the lock during the ramp, and this allows a recovery of these systems within 10s, which is perfectly acceptable. This means that they should be able to take data during ramp.

LHCb (F. Alessio)

This morning we were very busy ironing out a lot of troubles, so we didn't- follow the ramp. So, we were in internal RF2TTC clock all the time .

Anyway, we consider these tests very useful…