

End Week 31 (August 8th 2011) – Status of Accelerators

Linacs (R. Scrivens)

Linac 2: Linac2 was quiet.

We took advantage of the stop to reconnect POPS to find a 1.5m³/day water leak on the slit circuit of Linac2 (a pressure reducer had failed, actuating the over-pressure valve). A temporary fix was made, and will be properly repaired at the end of August stop.

Linac 3:

On Thursday we stopped to replace the complete oven by a new one and to install a new lead sample. But it is still difficult to tune up the source to nominal performance. The reasons are under investigation.

PS Booster (K. Hanke)

Busy and difficult week for the Booster.

On Monday 01 August septum problems (BE.SMH15L1) could be fixed by closing the door of the equipment room; this made the air conditioning work again and made the septum stable again. Another stop of 1,5 h as multipoles tripped; the multipole interlock rack circuit breaker had tripped, the EPC piquet reset it.

On Wednesday 03 August instable injection trajectories on NORMHRS, could be cured by adjusting the injection.

We cloned SFTPRO and mapped on MD4 for SPS MD; we are gaining first experience with INCA...

On Thursday 04 August at 09 :00 all beams stopped for interventions (switch back PS to POPS). In the Booster the following interventions were done parasitically: lift maintenance, access for Jan Hansen et al for the vacuum problem in the injection, access for Mauro et al for investigating for the new cavities, Antony did a tour of the machine, Richard checked for water leak in the inflector zone.

At 12:13 everybody was out of the Booster tunnel, we re-started but MPS did not come up, EPC piquet called.

At 14:09 the piquet had the MPS up and running, and at 16:34 beams were sent to the PS.

The PS but back beams one by one; we measured them and found them OK.

The PS operator noticed that R3 was not synchronised on SFTPRO, this was due to a broken connector on the input to a switch used for the H2 type synchro. Alan changed this and all looked to be back to normal.

At 18:41 the injection of R1 and 4 were bad and instable; at 19:04 the BI1.KSW went completely OFF; the specialist was called, he fixed the prb 20:01. His intervention cured the injection for both Rings 1 and 2 (bad repartition of the current in the slow kickers).

On Friday 05 August from 16:11-16:40 the PS MPS was down and all beams to the PS were stopped; from 16:44 -48 PS had still injection problems, which is why we put zero turns on the PS users.

On Friday evening all beams to the PS were stopped from 21:45 – 22:05 (POPS had tripped).

On Saturday 06 August short perturbations due to a trip of a Linac quadrupole and the distributor, both resettable.

ON Sunday 07 August another (resettable) trip of the distributor.

At 03:47 trip of LI.CRFQ, reset, stop of a few min.

At 05:41 the PS POPS tripped, all beams to the PS stopped.

Sunday 05:42 the Linac beam stopper went in and LT.BHZ20 tripped due to an error in the security chain. The access piquet was called; he arrived 06:50 and the problem was solved only at 08:28. Beams were put back for ISOLDE at 08:30 and to the PS 08:40.

ISOLDE (P. Fernier)

HRS

target #454 Uc2C run @30kV Cadmium pour Miniball via Rex; mesures entierelement effectuees, physiciens satisfaits.

Probleme : fuite de vide sur la cible ayant provoque plusieurs arrets de chauffage de la cible.

GPS

target #455 Uc surface run @50kV pour Isoltrap et Collaps. Pas de probleme, physiciens satisfaits.

PS (Y. Papaphilippou)

It was an eventful week for the PS machine with a quite start and a turbulent ending.

More specifically:

- On Monday morning and following the DFA254 problem of the previous week-end, the equipment specialists intervened and changed the thyristor (CT beams were cut for 1.5h).
- During Tuesday's FOM, it was decided to re-connect POPS to the PS, on Thursday morning at 9am, depending on the LHC fill. During the first part of the reconnection, other colleagues who needed to intervene on their equipment accessed the PS tunnel. POPS was again operational, after approximately 8h of intervention and setting up. At the end of the afternoon and the beginning of the evening, all beams became gradually available. It should be pointed that the BBQ signal and the Bdot no longer show high-noise levels, indicating the reduction of EMC issues, as compared to the previous POPS configuration. The arrival on the different flat tops has been optimised for the time available, but further work is needed for adjusting the regulation coefficients and reducing further the observed fluctuation of around 0.4Gauss at the beginning of flat tops.
- On Friday afternoon, it was found that the fine delay PIX.SSYNC-fd was not produced correctly, causing perturbation to the PS RF train and phasing. The timing specialist had to change a module (2h down time) and this had an influence on the timing of the injection kicker who had to be adjusted accordingly, in all users.

At the same time, all the high intensity beams presented several problems. One was related to a fault on PE.QKE16CT73 solved by the piquet power, who had to adjust a power supply card on the rack. In this respect, the observed ejection losses disappeared, but not the high injection losses. Optimizing the injection orbit in all high intensity beams and decreasing the injection field by 0.4Gauss, in a way to cancel the Bfield fluctuation observed with POPS, reduced these losses.

- After a quiet Saturday, a difficult Sunday followed: early in the morning, the MPS tripped without possibility to be reset with the PVSS application, dedicated for this action. The specialist was called and found that actually the MPS was down due to an external condition veto from the access system. The access specialist had to intervene and replace fuses, which were causing the problem (3.5hours down). Just a few minutes after solving this, and with the LHC waiting to be filled, all 40MHz cavities (operational and spare) went on fault without ability to reset.

The specialist was called and asked us to contact the piquet low level RF for helping him with the intervention. While contacting the piquet and the LLRF section leader, another problem appeared: all multi-harmonic beams (AD and LHC) were lost during acceleration, a few ms after transition. In this area, a wild phase oscillation was observed.

The piquet LLRF was finally reached and with the help of the OP crew, the acting PS supervisor and S. Hancock on the phone, tried to solve the problem. At first, the MHS module controlling the RF sources was reset, which tripped all 10 MHz cavities.

They came back after another remote reset. This action, in addition to enabling and disabling the Hereward damping and longitudinal feedback stabilized the situation. A further retuning of the 40MHz cavity by the specialist, enabled to produce a decent 36bunches beam for filling the LHC, already after 8 hours of efforts. But still, another problem remained, connected with all other beams, for which higher losses than the usual ones were observed during acceleration and just after transition. Several investigations of the OP crew and PSS were not fruitful and the LLRF piquet was unable to understand the source of the issue. At around 20:00, yet another problem appeared, when an "innocent" reboot of the GFA dsc, which was on alarm, put down the low energy focusing quads, without ability to reset them. The piquet power was called for solving this and piquet CO was also called to check the dsc still remaining in alarm. Both problems were solved (2h without beams).

The issue with losses after transition on CT cycles remained. The piquet LLRF decided to come back onsite but did not succeed to solve the issue. It was thus decided to reduce the intensity in these beams for not causing excessive losses and blm alarms and wait until Monday morning, for further investigations of the LLRF specialists.

AD (L Bojtar)

Quite week for AD. Monday we had MD, mostly spent with ejection line studies.

Friday we had problems with a DSC DADEPOW2, it went down several times while tried to switch between the experiments.

LEIR (C. Carli)

LEIR got the beam permit on Monday 1 August morning. Soon after that we managed to capture and accelerate the beam, although not at the nominal intensities for the EARLY beam. On Tuesday we couldn't have beam from the morning until the afternoon owing to a source problem. Beam was out again from Thursday morning to Friday late afternoon, owing to both the technical stop + water leak search in the inflector zone and source problems. So unfortunately we couldn't advance much with the beam setting up.

The source so he had to be opened which meant no beam from Thursday morning until Friday afternoon.

CO has provided a beta version of the Vistar program to replace the one made by OP and now unsupported (as Kary left CERN). Last Thursday CO has also provided a new release of INCA/LSA to correct existing bugs in the editing of functions.

RF high level experts managed to solve the problem with Cavity 43 (it was the driver circuit that was malfunctioning). As you know, in LEIR we have two Finemet cavities of which one is operational and the other one is a hot spare. Last year we have been running with cavity 43 but this year at startup it was discovered it was broken, so we had to switch to the 41. Now the 43 is repaired but we'll remain with the 41.

SPS (E. Metral)

During the past week, physics beams were sent to LHC, CNGS and the NA. In addition, some parallel MDs took place during the day and a 24 h floating MD took place on Wednesday (high-bandwidth feedback studies and TT20 steering tests).

First good results were obtained with the high-bandwidth feedback system. The set-up was used to excite transverse oscillations within the bunch and record the oscillations. The beam responded (mainly) at betatron lines and the upper synchrotron side band, which could be clearly seen on the BBQ.

As concerns the TT20 steering tests, whose goal is to try and gain another factor 2 in beam size reduction at the T2 target (for ion optics for NA64), good results seemed also to be obtained.

Finally, concerning the parallel studies on the longitudinal instability as a function of the radial steering at high energy, it was found that: (i) with less gain for the longitudinal dampers the margin for negative radial steering could be increased, (ii) a too low gain setting is not sufficient to stabilize the beam, (iii) a change of the bunch distribution using the phase between the TWC200 and the TWC800 does not affect the instability seen at flat-top. The longitudinal damper gain settings for LFGTWCAV1 and LFGTWCAV3 were reduced by 5dB at flat-top to obtain a larger margin for negative radial steerings.

On Thursday morning, the beams were stopped at 09:00 as planned by the PS for the POPS intervention. The beams were back only after ~ 8h, but we profit from this stop to perform several interventions in the SPS. In the evening, the RF piquet was called as we could not restart the TRX3 due to a water-cooling problem, which will need an intervention during the next technical stop.

On Friday, at the end of the morning Paolo Chiggiato called, as he suspected a vacuum leak around the dipoles 52030 and 52050. A leak detection was planned in the afternoon but nothing was found. The beam was back only late in the evening and it was decided to try and run without any intervention during the week-end. This issue will have to be followed-up on Monday.

The week-end was quiet until Sunday afternoon when the ZS tripped several times on the LHC cycle. After discussion with the expert, it was proposed to fill the LHC with a ZS HV of -30 kV (without CNGS and SFTPRO). This issue will also have to be followed-up on Monday.

LHC (M. Lamont)

Another typical LHC week.

Main issues were:

- Bunch intensity increased to $1.25E11$, while keeping emittances of 2microm.
- Single beam lifetimes > 50 hours
- Peak luminosity of $>2E33$
- Maximum time stable beams 26 hours, integral luminosity of 100 pb-1.

More details under:

<http://lhc-commissioning.web.cern.ch/lhc-commissioning/>

TI (P. Sollander)

Events of the week: CMS lost a big chunk of the record fill due to a cooling problem. One electrical perturbation this week due to a thunderstorm. Otherwise, fairly quiet week.

Tuesday 2nd August: First signs of a cooling problem in CMS during the evening and the night.

Wednesday 3rd August:

- 06:36 -- 400kV perturbation stops the LHC. -9% for 60ms, again between Génissiat and Mambelin, like last Thursday. EDF reported the cause to be a thunderstorm.
- CMS cooling problem continues during the day making them lose luminosity from the record fill. The problem was finally fixed towards the evening. This problem was followed up during the week. The problem was very difficult to understand. A panel will be set up to investigate and propose actions. Major Event report edited.