

## End Week 44 (November 5<sup>th</sup> 2012) – Status of Accelerators

### Statistics

nTOF: <https://espace.cern.ch/be-dep/OP/PS/default.aspx>

CNGS: [https://accstat.web.cern.ch/accstat/statistics/charts/2012/SPS/CNGS\\_Target\\_Cumul2012.jpeg](https://accstat.web.cern.ch/accstat/statistics/charts/2012/SPS/CNGS_Target_Cumul2012.jpeg)

LHC: <http://lhc-statistics.web.cern.ch/LHC-Statistics/index.php>

### TI (Jesper Nielsen)

Rather quiet week for TI operations.

<http://wikis/display/TIOP/2012/10/29/TI+summary%2C+week+44+2012>

### Linacs (D. Kuchler)

#### Linac2:

Linac2 had only one problem Linac2 had only one problem with some power converters in the transfer line Sunday evening.

#### Linac3:

Linac3 was running without problems.

### PS Booster (B. Mikulec)

The week was very calm with only small issues, until Sunday afternoon...

#### Thursday:

At 1pm problems started with the transverse shavers that stopped working. The piquet CO had to do first a manual reboot of the corresponding DSC, then he exchanged a power supply, but in the end he had to repair the ventilator of the power supply. Cycles using transverse shaving (e.g. LHC) suffered from perturbations during 1h45min.

#### Saturday + Sunday:

The two bunches from ring 4 of SFTPRO and CNGS showed different trajectories in the PSB-PS transfer line compared to bunches from the other rings. The recombination septum BT4.SMV10 had to be adjusted.

#### Sunday afternoon - Monday:

1:25pm: From time to time, bunches from rings 1+2 were missing. This could be traced back to the recombination septum BT2.SMV20. The piquet PO had to come in to change an auxiliary power supply. 2 hours downtime.

4pm: The LHC PROBE cycle was debunched. The operator had to reload/adjust the RF function.

4:05pm: Injection problems realised for TOF, which was then also observed on the LHC50ns cycle. SFTPRO and CNGS could still be delivered, as they were much less affected by the problem thanks to different injection trajectories.

4:45pm: The piquet CO and piquet PO have been called because one of the power supplies in the Linac2-to-PSB injection line (LTB.DHZ40) showed a strange behaviour (1553 RTI error and inversed polarity). The piquets couldn't be reached immediately, so the operator called in the PSB supervisor. It was obvious that the measurement of the PS B-field used to calculate the PS stray-field compensation at PSB injection was not working (actually since 2:17pm). Several DSC reboots did not help.

5:40pm: Both piquets CO+PO worked on the problem. The piquet PO diagnosed from home an issue with the power supply LTB.DHZ40 and came back to CERN. The piquet CO rebooted again the DSC and restarted the real-time task for the stray-field compensation (SFC).

6:50pm: The PS B-field measurement was again working, and it solved at the same time the non-issue of LTB.DHZ40 (the polarity inversion came from the fact that the power supply was receiving NaN from the SFC system due to the missing field measurement).

7pm: The PSB crew realised that although the B-field measurements seemed to be working and the SFC calculated corrections that were applied by the power supplies LTB.DHZ30 and 40, the LHC50 beam was still heavily affected by injection trajectory fluctuations ( $> \pm 5$  mm). This was also seen by varying intensities between the two SFTPRO injections.

8pm: After diagnosis there seem to be some indications that the correction that is applied is not corresponding to the PS B-field at the time when the PSB cycle in observation is injected. It was decided to call the OP specialist (J-M. Nonglaton) and ask for his advice. He came in earlier to start his PSB night shift to help debugging. Unfortunately the problem could not be understood, but pointed effectively to some timing problems. Finally, it was decided to give up for the moment and try a workaround: the supercycle was programmed such that the two PSB LHC50 cycles always see the same PS B-field. In such a configuration the two LTB power supplies could be adjusted manually to allow at least filling the LHC and debugging the problem later.

11:45pm: Switch to the LHC filling supercycle. This solved all the issues with the SFC.

00:30am: LHC filling terminated.

00:35am: Switch back to the old supercycle and the problem is back again.

01:15am: S. Cettour programmed a new sequence of same length, filling it only with SPS cycles. Then one-by-one the PSB/PS cycles were added at the same original positions. Everything went perfectly well until in the end also the spare cycles were added, at which moment the problem re-occurred.

02:20am: These tests showed that the SFC is applied too late, only at the following occurrence of the corresponding user. Investigations ongoing...

3:50am: SIS problems starting, prohibiting injection from Linac2 during 1h20.

## ISOLDE (Pascal Fernier)

GPS : machine stopped due to problems of the front-end.

HRS: target #490 U<sub>c</sub>2c; beam for Rex; unfortunately the run has been cancelled due to vacuum leak on Rex RFQ ; after 2 days of tests with vacuum and water we couldn't identify the origin of the problem but the vacuum went back to nominal after pumping again - to be followed-up this week.

Change to target #492 for a run on LA1 line; setting-up and stable beam Friday morning, but Saturday we lost radioactive beam in the HRS RFQ; we try all the settings but nobody understood why beam disappeared; problem under investigation Monday morning with target specialists.

## PS (R. Steerenberg)

The PS had a good week last week with an average beam availability of 93% for all the physics users.

We nevertheless still suffered sometimes from nearly complete beam loss at transition, most probably due to the persisting time shift problem of the PFW functions, causing radiation alarms. This will be remedied tomorrow during the technical stop, when the more modern CVROB module, that does not require conversion of the functions received, will replace the GFASs.

Throughout the beginning of the week the LHC beam intensity was increased until we reached a total intensity in the PS of more than  $7E12$  protons at transition, corresponding to an LHC bunch intensity of about  $1.95E11$  ppb. However losses along the flat bottom and the rise of the B field had increased. In agreement with the LHC the intensity was reduced to  $6.7E12$  protons at transition in the PS. The result was nearly the same bunch intensity in the LHC with similar luminosity as the emittances were slightly smaller. The extra intensity was lost along the injector chain.

More details can be found in the [PSS minutes](#).

## AD (C. Oliveira)

La semaine a été plutôt calme, aucune grande panne.

Il y a juste que les physiciens se peignent qu'ils reçoivent moins de faisceau. D'habitude on fournis au tour de  $3.3E7$  PBAR et en ce moment c'est  $3.1E7$  PBAR.

On a une grosse perte entre 2GeV et 300MeV, environs 10%. Il n'y a aucune raison évidente à cela. Il faudra regarder plus en détail...

### LEIR (C. Carli)

Unfortunately, LEIR performance is still lousy with intensities available for both the EARLY and NOMINAL machine cycle far below the expectations. Linac3 was running well providing 20 to 22 uA of beam current (this is more than we had most of the time this year, but still lower than intensities we used to have longer ago) most of the time reliably.

The main problem are losses along the low energy plateau this year limiting not only the NOMINAL cycle, but as well the EARLY cycle. Furthermore, it was not possible to improve the situation by proper adjustments of the electron cooler gun voltage as a year ago. After quite some tests with unsuccessful empirical optimizations, I asked specialists from TE-VSC to have a look: they found an increase of the pressure since the beginning of the week only and a change of the gas composition, but as well that the pressure decreased again during investigations. Note that immediately after switching on the beam again, the beam life-time was improved very much, but degraded again after some time. The situation is still confusing and further investigations are certainly required...

### SPS (Y. Papaphilippou)

It was a busy week for the SPS devoted to the usual physics program, filling the LHC, the HIRADMAT experiment and a floating MD for LHC 25ns beams. The main issues were related to several faults and interventions to RF transmitters, the search for an 18kV cable fault, the stop for the fiber cables moving and a MKD kicker fault. More specifically:

On Monday all beams were stopped for 2h for changing an amplifier of TRX3. At the same time, it was tried to trace the fault on the 18kV cable but without success. This was carried out on Wednesday and in parallel to the fiber cable moving. On Tuesday morning a problem with the SEMS which monitor the position and angle in the North area targets occurred after a local server restart. The SEMs have actually moved to a wrong position and had to be re-adjusted for computing the symmetry correctly. On Tuesday afternoon and evening, shots of 25ns type beams were sent to HIRADMAT for tests with the UA9 crystal. The crystal was moved out on Wednesday and the HIRADMAT program was continued with another experiment on Thursday and Friday evening. On Wednesday and due to the fiber cable intervention which requested the stop of the SPS (this was indeed not clear when the intervention information was communicated) and the subsequent LHC filling, the floating MD was cancelled and moved in parallel to physics on Friday. On Thursday morning, a fault occurred to the MKD kicker. The piquet was called and found that a switch had to be changed. The SPS was stopped for 4h, the time needed for the intervention and vacuum conditioning. At the same time an intervention to TRX2 took place first early in the morning and then at noon (changing a power supply, some cards and later a tube). The end of the week was quite with no major invent apart from a 1.5h stop on Sunday morning for an MKE4 kicker fault solved by the piquet (kicker in local mode which had to be reset)..

Since Sunday night the SPS is sufferering from a timing problem (no MTG signals arriving), prohibiting any operation. Investigations ongoing.

### **LHC (M. Lamont, J. Uythoven)**

- Total integrated luminosity during the week, 1.1 fb-1
- Total integrated luminosity this year 19.4 fb-1, 20 fb-1 expected throughout coming week
- Inst. luminosity in ATLAS and CMS beyond  $7 \times 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$
- Stable beams during 40%

More details under:

<http://lhc-commissioning.web.cern.ch/lhc-commissioning/news-2012/LHC-latest-news.html>