

## End Week 49 (December 11th 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)

Here goes for the TI Snowy

<http://wikis/display/TIOP/2012/12/04/TI+summary%2C+week+49+2012>

Day	Event
Tuesday, December 3	<p>Electrical perturbation, stops POPS, LHC plus magnet ALICE and LHCb. See <a href="#">Major Event</a> Between Genissiat and Creys</p>  <p>The map shows the CERN site with various locations marked, including Crans, CERN, Bois Tollot, Foretaille, Verbois, Arlod, Cize, Izernore, G�nissiat-P, St.Vulbas, Le, Cruseilles, Chavanod, Montagny, Lanc, Serri�res, Brens, Marnisse, Albarville, Ugin, and Vent. The map is color-coded with red, green, and yellow lines representing different paths or connections.</p>
Wednesday, December 4	<p>All water circuits down in BA81. It seems to have been a problem with an electrical connection. EN-CV will investigate the cause, starting with infrared cameras on the connectors. See <a href="#">Major Event</a></p>
Saturday, December 8	<p>Isolde electrical switchboard burned, and stopped the water circuits. See <a href="#">Major Event</a></p>  <p>The photograph shows a complex electrical switchboard with many colorful cables (red, blue, green, yellow, orange) connected to various components. The cables are bundled together and run through a metal rack.</p>
Sunday, December 9	<p>High level alarm in PX15 sump pump. Could be a problem with a stuck floater switch. TI surveils the start stop times of the pumps to estimate the level for now. Intervention foreseen Monday.</p>

## LEIR (Django Manglunki)

Another good week for LEIR, with over  $5 \times 10^{10}$  charges ( $\sim 5 \times 10^8$  ions/bunch) routinely delivered to PS for SPS on "NOMINAL", while "MDOPTIC" was daily used for reference beam measurements, machine developments, and general optimization.

On Monday at 22:10 a glitch only tripped the RF cavity and the extraction septum. After restarting the ECR source, LEIR was back up before beam was needed as POPS has tripped too.

Wednesday was a dedicated injector MD, no beam to SPS from 7:00 to 17:00. In the morning five CVORB crates were updated all at once, with a new firmware version. Since it led to degraded beam performance the old versions were rolled back. A new attempt will be tried next Wednesday, updating one at a time, whilst checking all beam parameters, in order to identify the faulty behavior. The rest of the day was devoted to measurements on MDOPTIC, using non-PPM equipments which cannot be touched during normal operation.

Several times during the week, the frequency offset on the flat bottom had to be slightly modified in order to optimize the capture. This is due to fluctuations of the injected ion current from the ECR source, modifying the space charge seen by the electrons of the cooler, changing their energy, which in turn changes the energy of the ion beam.

MDOPTIC measurements are now being done with only one cycle in the supercycle, making sure the simultaneous PS cycles are always the same (currently EASTA+TOF), including in spare, in order to get rid of large deviations coming from different injection conditions due to the PS stray field at the exit of the ITE loop.

## AD (Lajos Bojtar)

Good week, with a few problems.

-Wednesday night I was called in , because ALPHA didn't get much beam.

It was due to the ramping up of AEGIS's 5T solenoid. The GEM82 was necessary to correct the steering of the line, but didn't work. The steering took longer than usual due to the faulty GEM, but managed finally without it. The GEM82 was repaired later Friday afternoon.

-Several times during the week the power supply DR.DVT2904 didn't follow the GFA. This problem comes and goes. It is not clear where is the problem, it can be the power supply, its control, the GFA, or the cabling. So far the experiments can live with this problem. To be followed

## ISOLDE (Pascal Fernier)

GPS : machine arretee cette semaine.

HRS : target #463 Pb pour une experience de Madrid sur ligne experimentale RC3 et pour implantation (Solid State Physic) sur ligne LA1

Target change, setting-up, proton scan, yield check et faisceau pour les utilisateurs qui ont pu faire des mesures satisfaisantes malgre les problemes rencontres:

-- probleme de vacuum leak sur la tape station de RC3 et "bricolage" des interlocks pour leur donner le faisceau.

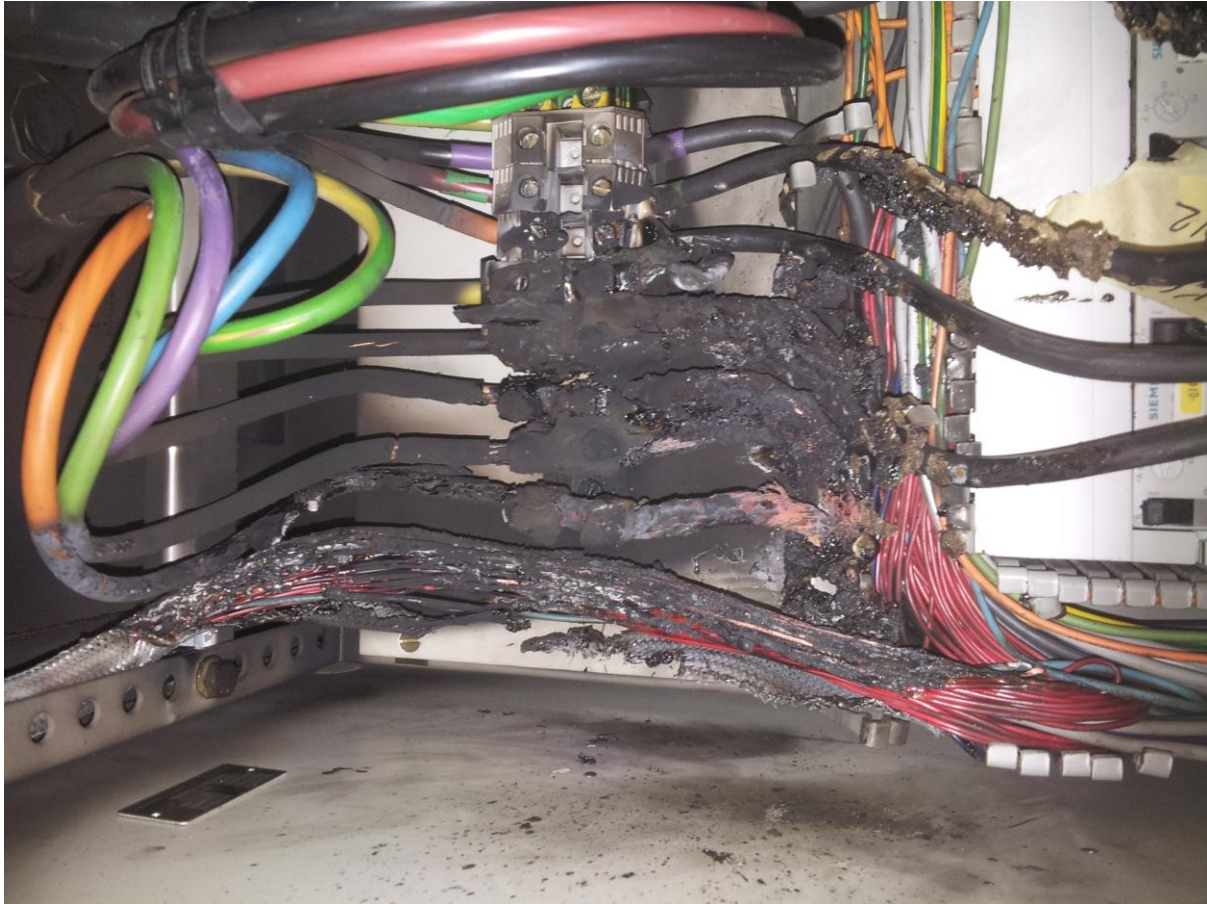
-- samedi vers 15H30 arret protons de la ligne injection du a interlocks eau; apres inspection du network Isolde, il apparait qu'une vanne de surpression s'est enclenchee et debite l'eau par terre; odeur de brule --> des cables electriques ont brule dans une armoire electrique; reparation jusqu'a dimanche 02H00.(photo 1)

-- dimanche a 02H00 detection d'une fuite eau sur l'aimant Ebis et l'eau s'est accumulee sur le film plastique de protection de la Trap (see picture); intervention de RP pour analyse de l'eau et intervention des pompiers; fin intervention dimanche 06H00.(photo2 - turn anticlockwise 1 time the photo)

-- probleme pour redemarrage des turbo pump vacuum du RFQ --> intervention piquet vacuum. G.Vandoni et S.Blanchard.

Finalement beam back @14H00

Lundi matin: Trap ne semble pas avoir subit de degat, inspection de Ebis en cours



## Booster (Jocelyn Tan)

### Tuesday:

- BR2.DHZ5L4 was in alarm in LASER, but all fine on the knob. S. Page is following this up.
- Due to Meghan's MD, the (non-ppm) value for a sextupole was changed, leading to an intensity loss in ring2 for the LHC25ns beam. This was soon corrected.
- Reload of DPSBBUME.
- The injection steering has been copied from CNGS to EASTB and once more to SFTPRO.

### Wednesday:

- Reboot of DPSBBUME.
- The specialist has been contacted for DIAMON problems.

### Thursday:

- Reset of BE1.KFA14L1.
- Reset of BI3.DIS.

- At 11pm BTP.DHZ40 tripped. A reset failed, therefore the piquet PO was called. He exchanged the power supply. 0.5h downtime for beams to the PS.

#### Friday:

- Early morning around 4am, no beam captured on ring 4 (none of the cavities for ring 4 pulsing). The operator found a rack off (rack 714 ring 4), switched it back on and ring 4 was again working normally.
- The beam gate for BT.BCT10, BTY.BCT112 and BTY.BCT325 were adjusted with the STAGISO user and the settings saved in the LSA DB.
- Reboot of DPSBBUME.

#### Saturday:

- At 3:30 PM all quads and bendings in BTY went down due to a short circuit (trip of circuit breaker in Bld 197). TI colleague confirmed that a bunch of cables, from the electrical board of the water pumps, were burnt. The experts have worked till late evening (1:10AM) to fix the problem. Isolde got the beam right after, but meanwhile the physicists went back home. Down time : 9h42'.

#### Sunday:

- Early in the morning, there was a radiation alarm for Isolde, although no beam was sent to Isolde (no nobody in Isolde hall). The PI.RP was called and checked the monitor PAXY06 which went back on its feet at once. Should the alarm be of type B, we should cut the beam for Isolde.

## PS (Simone Gilardoni)

The PS had a very good week, with only minor issues, but still very busy.

Concerning the operational beams, after the end of the NA with protons and CNGS we continued with the usual production of TOF, EASTs and AD beams plus the ion beam for the NA.

AD is still extracted using the new bump plus the MTE kicker, and the AD efficiency was not affected by the change. In the same context, we sent the 50 ns beam for the last physics fill of the LHC with the new extraction bump with four independent bumpers plus new high-energy orbit corrector. The analysis of the fill, in terms of losses at injection in particular, is not finished yet, but already the luminosity was the same as the previous fills. This was not the case when we did the same test in summer, where the luminosity was lower compared to usual operation. The improvement is due to the fact that we were able to reproduce much better the extraction conditions ( $xx'$ ) at the beginning of TT2 with the new bump compared to the old one. The last beam to set with the new extraction is TOF: we did already some more tests proving that we can extract with different trajectories in the ring without affecting the beam condition at the target.

We prepared also the LHC25 ns variant with the same bump used for the test of the 50 ns in the LHC. Unfortunately we could not test it yet in the LHC but we would like to do it.

Concerning the LHC beams, we delivered as usual the 50 ns for luminosity production, varying the satellite population according to the LHC requests. The satellite population is varied by changing one of the longitudinal blow-ups and the voltage of the 40 MHz cavity. It is however difficult to monitor the efficiency of the process in the PS, so we have always finally to rely on the feedback from the LHC. We then delivered the 25 ns with  $1.2e11$  ppb for the scrubbing run.

On Monday, we tested the beam quality of the 25 ns beam after the last splitting before the extraction, probing the eventual changing in the average bunch length along the batch and comparing the cases with the

gap short-circuit of the 80 MHz cavity used for ions open or closed. This was meant to test the coexistence of the ion cycle for the NA and the filling cycle of the LHC for the scrubbing run in the same supercycle. The bunch length increases with the gap open but by a very-very small amount. It goes from 4.22 ns to 4.28 ns (averaged on the same number of cycles) and with same standard deviation of 0.022. Then we checked also the presence of satellites in front of the batch, and we could not notice a significant difference between the cases gap open and closed. Apparently then the situation is better compared to the LHC 50 ns production beam, at least for what our instrumentation can detect also in terms of satellites.

The operator have the "consigne" to leave open the short circuit of the 80 MHz cavity used for ions also during the filling of the LHC. We might eventually revise the situation for the physics run at 25 ns in the LHC.

On Tuesday we sent to the LHC the 24 bunches 50 ns high brightness beam that was put in collision (filling scheme: 6-24-36-6 bunches). The increase of the specific luminosity in the LHC with this beam is apparent, with the injector complex providing to the LHC about 1.6-1.7e11 ppb in 1-1.3 mumrad (1 sigma norm). The intensity was reduced from 2e11 ppb to 1.9-1.8e11 ppb in the PS to make easier the comparison with the usual 50 ns. We prepared also the 25 ns variant with 48 bunches for the high brightness beam, that was sent to the SPS the last time on Saturday. The emittances at injection in the SPS are about ~1.3 mumrad (average emitt, 1 sigma norm) for 1.15-1.2e11 ppb extracted. We hoped to send it to the LHC during the weekend, but unfortunately it was not possible due to the progressing of the scrubbing run.

The issue with the transverse emittance of the 200 ns proton beam was finally solved on Saturday evening. It was found that the thick tails observed in the SPS, exceeding by far the usual ones present already at injection in the PS, were in fact produced by the injection kicker of the SPS, touching one of the bunches at injection.

Concerning MTE, we continued the test of stability for the capture. We could extract up to 2e13 ppp, with trapping efficiencies better than 20%. The fluctuations observed in the past are still present, but the capture seems to remain, for the setting found, of the order of 20%. The fluctuations are observed also on the operational beams: the tune at injection might vary by few  $10^{-3}$  depending on the preceding cycle.

Concerning POPS, we had another trip very similar to the usual ones. The EPC colleagues would like to have a stop of 2 hours to do some tests before the Xmas break.

## SPS (Benoit Salvant)

It was a good week for the SPS.

The SPS reliably delivered ions to NA61 and high intensity beams to LHC (50 ns for physics and 25 ns for the scrubbing run). The main faults of the week were another earth fault on an 18 kV cable, and several trips of the Mains and transmitters.

The setup of the ion beam for NA61 was successfully performed on Monday, after the proton physics for the North Area was stopped for this run. In the morning, the kicker expert was called to restart the MKD. In the evening, the power glitch brought down the main power supplies.

On Monday night and Tuesday, tests were performed in the PS and SPS and it was confirmed that the ions for NA61 and the 25 ns for LHC scrubbing could be kept in the same SPS supercycle. In fact, it was observed that leaving the PS 80 MHz cavity relay gap open did not appear to affect the 25 ns beam for LHC scrubbing, while it strongly affects the 50 ns beam for LHC physics. Tests with the new h9 beam also took place.

On Wednesday, there was a coasting MD for collimators. In the morning the mains tripped because of a fault on an SMD1 18 kV cable (1h downtime). The EDF intervention was planned for Friday morning but it in fact happened in the afternoon without informing the operation team, causing several trips of the mains before it was understood that it came from the EDF tests to find the location of the cable fault (1h downtime). The access system went down but was brought back up by the specialist within 15 min. During the night the transmitter TRX10 tripped and was repaired by the piquet RF (40 min down), but in the early morning TRX1

and TRX10 tripped again, and the piquet changed a microswitch on TRX10 (1h30 downtime) and continued to work on TRX1 (8h downtime). However, the ion beam could be produced without TRX1 and the LHC did not request high intensity beams as they were setting up the ADT for the scrubbing run, so that the impact of these faults on beam time was limited.

On Friday, the 25 ns h9 beam was tested in the SPS. The mains tripped again and the piquet EPC was called to restart SMD7 (50 min downtime).

The weekend was very quiet. The issue of the tails for the 200 ns beam could be corrected on Saturday by tuning the injection kicker delay.

## LHC

Mixed physics and scrubbing. Physics dogged by problems with TED at bottom of TI8 (necessitating special access procedure) and TDI. Good progress with 25 ns scrubbing.

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