

# Accelerator Complex Status

## End week 16 (Monday 23 April 2018)

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### TI (Clement Pruneaux)

On Tuesday 17.04 there was a trip of SPS compensator BEQ3 and 400/66kV transformer EHT1. Thursday 19.04 a ventilation interlock stop the beam in the LINAC4 as a result of a door left open on the surface to a hall that contains a pressure sensor.

Details: <https://wikis.cern.ch/display/TIOP/2018/04/23/TI+Summary+Week+16>

### LINAC2 (Giulia Bellodi):

Again an excellent week for Linac2, with 100% uptime.

### LINAC3 (Gialia Bellodi):

The start of the week was dedicated to finalising the set up of the high energy part of the machine, after the IH output:

stripping foils characterization was carried out on Monday and the debuncher cavity scan in the LBS line on Tuesday AM.

Beam was officially handed over to LEIR at 15h on Tuesday.

The source behaviour over the rest of the week was rather unstable, needing frequent manual readjustments to recover performance.

Oven2 was switched on at the weekend and the next oven refill is scheduled to take place during the week.

### LINAC4 (Silvia Schuh):

Overall, it has been a good week of 24/7 operation with overnight OP surveillance, with only a few faults and running with nominal PSB chopping pattern overnight: 625 ns beam ON, 375 ns beam OFF. Linac4 is running in PPM mode (mixed MD1 and MD5 super-cycle, with two different chopping patterns and common beam destination = L4DUMP).

Investigations on source intensity are ongoing, the possibility of an alternate gas injection valve is considered for which an order has been placed.

The DTL1 anode supply was broken and had to be replaced. A design modification is under way.

Spikes in the beam current were noticed downstream from the RFQ, no correlation with chopping pattern, seem to be linked to a spurious SIS interlock acting on the pre-chopper to cut the beam at 100us, being followed-up.

BEAM mode was lost due to a ventilation-interlock triggering the external conditions - the door to room 400/1-403 was left open and the monitored pressure compares this room with the tunnel, to be followed up.

BI did some laser wire testing as well as testing of wire scanners. Stripping foil tests were carried out during most nights.

Linac4 inspector server rebooted and autopilot is now running again.

AFT logging was started Monday 16/4/2018, as planned.

### **PSB (Simon Albright):**

It was a difficult start to the week due to the BR1.QDE2 temperature overtemp warnings that started during the previous week. Due to the trips over the weekend and on Monday it was agreed with experts to keep some ZEROs in the supercycle to prevent magnet overheating until there was an access. To work around LHC and ISOLDE requests an initial access was scheduled for Tuesday to check water flow in the cooling circuits and inspect the magnet with a thermal camera. The first access showed that the magnet was not overheating and the coolant circuit was working correctly, so a second access was needed to inspect the thermal cutout. Coinciding with the magnet access a team also went in to perform a visual inspection of the prototype wirescanner.

Due to the regularity of the trips the second access was scheduled for Wednesday afternoon to coincide with a beam stop required for a dedicated MD. However, on Wednesday morning the MD was reorganised for that morning (from the afternoon) to coincide with an LHC access. The access was not rescheduled as it required the FirstLine to be available to lockout the machine. A second wirescanner access was agreed at the same time to allow additional information to be acquired by the wirescanner team and confirmation that the wire is broken. The inspection of the thermal cutout on BR1.QDE2 showed that there was a poor connection, it was therefore replaced and has not triggered the interlock since.

Two additional trips of the MPS on Friday required Piquet intervention, and after the second trip the spare MPS was put in operation until the cause can be diagnosed. There were also a small number of other problems, but these had minimal impact. The White Rabbit B-Train was put into operation for the ISOLDE beams on Thursday afternoon to start the reliability run, if this goes well it will be rolled out to other operational beams as well.

### **ISOLDE (Miguel Lozano):**

It has been a very good week at Isolde. IS633 has been smoothly running and taking 8B from GPS according to schedule.

No mayor issues to report .Only some interruptions due to some problems at the Booster main power supply.

### **PS (Frank Tecker):**

The PS had an eventful week, with beam availability around 89%.

All standard beams were delivered. On Tuesday, the AD beam, that had been prepared before, was taken by the AD for the first time. On Friday, the lead ion beam was send towards the PS.

A dedicated MD, foreseen for Wednesday afternoon, had to be rescheduled on the fly on LHC request for the morning. Several quadrupoles in the PSB to PS transfer line were re-cabled to study a matched optics. The beam was steered through the line and some measurements taken. A timing repeater failure on CFV-365-CPOW delayed the startup after the MD by ~3 hours. This was very difficult to diagnose, as there were several seemingly unrelated problems: beam loss, first suspected to be consequence of the MD, internal dump found blocking, transition problems, and extraction elements not pulsing.

While the majority of downtime originated from the Booster, other faults on F61S.BHZ01, F61.BHZ01, and F61.QFO03 affected the beams, in particular for the EAST Area. Another access took place to verify the heating problem on ZT10.QDE01, but the present conclusion is to run with a limited current, resulting in a reduction of the momentum for T10 from 6 to 5 GeV/c, which has been accepted by the users for this year's run.

### **AD & ELENA (Sergio Pasinelli):**

Here is few lines on the ADE week.

1. Behaviour of FGC3 (function list) seems to be correct and are following the references.
2. Cannot synchronize AD and PS due to an interlock from experiments. This interlock is not used anymore by the experiments (put 50 Ohms).
3. Wrong timing on several power supplies in the injection line. ADE is using a special timing during the ramp-up of theses power supplies an switch to the injection synchronized timing after. This injection timing was not produced correctly.
4. Missing beam from injectors (MD,ACCESS etc..)
5. Bad manipulation on the security chain in CCC. We have lost the all conditions.
6. Intrusion test in ELENA during DSO tests => horn and several power supplies went down.
7. Stochastic kickers in the wrong position. Due to an intervention on the air distribution during the shut-down the kickers stay in the position IN
8. Setting-up => Beam ejected!

Also few lines on ELENA

1. Electron Cooler power supplies cabling
2. Power supplies upgrades (Electronic, control, etc..)
3. DSO tests
4. Beam from the source (H-)
  - a. Ion switch control (cannot switch ON after a switch OFF)
  - b. Some power supplies are disconnected to the magnets! (we don't who decided to disconnect these power supplies)
  - c. All power supplies managed by the crate cfc-193-reth2 were unreachable (Network switch in fault)
  - d. Beam seen in first screen in ELENA
5. Beam from AD (Pbar)
  - a. Beam seen on the first scree in LNI

### **SPS (Hannes Bartosik)**

The SPS had a beam availability of only slightly more than 80%. Most of the downtime was caused by the pre-injectors. In addition, a 400 kV transformer tripped because of a weasel and subsequently one of the extraction sextupoles could not be restarted resulting in a total of about 6 hours downtime for the North Area.

The work on the fixed target cycle focused on the investigations of slow extraction losses. It was observed that the losses at the extraction septa showed an increasing trend with time and some correlation with the duty cycle for the North Area. Several checks were performed in collaboration with ABT experts but the results obtained so far are not conclusive.

The LHC started taking trains of up to 3x72 bunches for the setting up of the transfer lines and for injection kicker conditioning in preparation of the LHC scrubbing run early next week. Both the 25 ns standard beam with 4x72 bunches ( $1.15 \times 10^{11}$  p/b within 2.5  $\mu\text{m}$ ) as well as the BCMS beam with 3x48 bunches ( $1.25 \times 10^{11}$  p/b within 1.7  $\mu\text{m}$ ) are ready in the SPS. Also the MKP setting has been optimised for the 200 ns batch spacing required for physics.

In preparation for the start of the AWAKE physics run next week, the AWAKE cycle has been setup and successfully tested including the bunch rotation and extraction to the TT40 TED. Only the rephasing to the AWAKE clock remains to be tested.

On Wednesday the first dedicated injector MD block was scheduled. The LHC arranged for access in the morning and so the dedicated PSB-to-PS transfer line MD as well as the SPS access for the crab cavities originally planned for the afternoon had to be re-scheduled for the morning in order to minimise the impact on the LHC beam availability. Unfortunately, due to a timing problem in the PS there was no beam available in the afternoon and so the dedicated slow extraction MD in the SPS could not be performed and the LHC could only be filled at about 7 pm.

### **LHC (Stefano Redaelli and Jorg Wenninger):**

Following the last loss maps and their analysis, first stable beams could finally be delivered on Tuesday 17th April, 6 days ahead of the official planning. On Friday beta\* levelling from 30cm to 25cm was executed for the first time in stable beams (with 12b), and later repeated up to 339 bunches. By Saturday the 75b step had been completed, and the first two fills of the 300b steps took place over the weekend.

A BSRT calibration with 10 bunches (emittances 1.5 - 4.5  $\mu\text{m}$ ) was performed on Saturday.

Trains of up to 216 bunches were injected and the new MKI8 magnet was vacuum conditioned with up to ~1200 bunches circulating in both beams.

The machine ends the week almost commissioned, only few items remaining on the table.