

Accelerator Complex Status

End week 25 (Monday 26 June 2017)

TI (Jesper Nielsen)

Details: <https://wikis.cern.ch/display/TIOP/2017/06/26/TI+Summary+Week+25>

LINAC2 (Rolf Wenger):

Linac2 is running very well, 100% availability.

The source suffered from an increased sparking rate from Tuesday to Friday (about 20 per day) – maybe related to the hot weather. On Wednesday the source high voltage was slightly reduced (from 90.8 to 90 kV) to counteract; the beam intensity was not affected.

LINAC3 (Rolf Wenger):

Linac3 is running quite well. The RF Thomson generator of the source trips once or twice per day but can be restarted remotely.

Thursday afternoon the temperature of the chilled water supply increased which let the injection solenoid trip. EN-CV solved the temperature problem and re-adjusted the local Linac3 cooling station. The current of the injection solenoid was slightly reduced (from 1260 to 1250 A) in order to decrease the solenoid's temperature. A further reduction would cause the source to become instable. The situation has stabilised afterwards. The beam intensity is between 30 and 36 uA.

LEIR (Marie Elena Angoletta):

A quiet and productive week for LEIR, with many MDs and activities going on.

Monday 19 and Tuesday 20: LINAC3 MDs. No beam nor meaningful cycles for LEIR (only LIN3MEAS)

Wednesday 21: ITE BPM studies. In the morning before the start of the MD there were problems with several elements, in particular with the kickers. The piquet managed to quickly get back into operation.

Thursday 22: in the morning more ITE BPM studies. In the afternoon a LLRF MD for the calibration of the cavity servoloops, following changes in both the LLRF hardware layout and the HLRF for the cavity CRF41. An improved firmware including a table to compensate for the HLRF transfer function will be deployed during the July technical stop and a further MD to calibrate the voltage by using the Tomoscope will take place after that. The RF Thomson cavity tripped during the afternoon and the beam took a while before being back, but this did not have any impact on the MDs as beam was not required. In the late afternoon/evening there was a second LLRF MD to begin studying the setup and operation at h=3+6.

Friday 23: initial preparation by Stephen Hancock for the cavity voltage calibration with the Tomoscope. Everything is as we hoped for and there are no showstoppers for this activity.

Saturday 24: more trips from the RF Thomson cavity, quickly solved. They are apparently linked to the water cooling temperature.

PSB (Alan Findlay):

We've had worse weeks for the PSB, but we've had a lot better!

The MPS was problematic Thursday, with a thermal problem causing one of the supplies to be swapped with the spare, but this generated 2 hours downtime. We're waiting for an update as to when the original will be re-connected. BE4.DHZ11L1 gave the machine a lot of grief during the week, with the PiPO having to intervene numerous times to try to repair it. Eventually on Friday evening he changed the power supply in the shadow of the cavity issue and it has remained operational since.

Friday evening around 19H15 the R3 C16 cavity, which is used for bunch shaping and longitudinal shaving, tripped and required the cavity specialist to intervene. After diagnostics on the surface, Matthias required a machine access to change the amplifier, so the access process was put into motion. Slowly. At 20H30 the machine was vented for access, but it seems that all the standard IMPACTs that are set-up for such situations we're de-activated for the last technical stop as usual, but they were not re-activated afterwards, as is normally the case. After a long wait for the unfortunate RF & RP specialists, the ZORA piquet had managed to get things sorted out, then after a further delay for the access system to get the updated information, they were finally granted access after 1 hour 15mins. The result was not good however, the changed tube demonstrated the same fault, and it's now expected that there is a faulty connector/socket for the tube. As this equipment is rather old and access very difficult, it will take some time to check how exactly this equipment was made and how to change the connector/socket. Matthias was to check the documentation Sunday with the aim of confirming with the rest of the HL team how best to replace/repair the item. An update by midday Monday can be expected. It took 3hrs 20mins to get through this process, so beam was back for 3 rings and in degraded mode for R3 around 23H45.

The team enabled the shavers where necessary to replace the missing longitudinal shaving on certain users.

All IMPACTs have since been re-activated for PSB & L2.

Otherwise the week was spent setting up MD beams and adjusting operational beams as required. We also put the R4 Finemet back in operation as a H=2 replacement for the GPS & HRS users on Wednesday and have been running with this since.

Once again this week, there were several periods where there weren't sufficient MD users free to do the MD program and the setting up required. This we'll try to keep an eye on, as it often delays the setting up of the upcoming beams that are required in the complex.

Overall we got through the heatwave with a few issues still outstanding, but there's hope of a quick recovery.

ISOLDE (Miguel Lozano Benito):

It has been a very nice and smooth week at ISOLDE.

Beam from GPS to IDS , windmill and some parasitic collections at GLM.

No mayor issues to report.

No activity on HRS until Friday when we installed a new target for the next run.

First accelerated beam on HIE-ISOLDE to miniball for detectors calibration.

Stable beam $A/Q=3.5$, 3.95 MeVu using 5/15 accelerating cavities. Some cavity trips during the weekend but quite stable apart from this.

PS (Ana Guerrero):

Relatively quiet week in PS with a few issues nevertheless, where all beams have been delivered as requested.

On Monday evening the beam was down during $\frac{1}{2}$ hour due to an issue with 10MHz cavities C76 and C11 and the specialist had to intervene. The same night a repeater failure stopped all 200MHz cavities and thus the beam, during $3 \frac{1}{2}$ h. The intervention was carried out by RF who was already on site.

On Tuesday the water cooling issue affecting SMH57 was solved. In the afternoon PIPO was called for a non-resettable trip on bumper 14, 40m beams down. Once back, PE.SMH16 tripped several times due to a vacuum interlock triggered mainly by the losses created by kicker 71 pulsing with incorrect user value. Each recovery was slow since beams had to be slowly added to the SSC. Beams were affected during $2 \frac{1}{2}$ h. On Friday a problem on a NIM crate affecting the LHC beam control stopped all LHC beams over $\frac{1}{2}$ h.

Measurements on MTE emittance in SPS show almost twice emittance in the core than in the islands. The issue is under investigation. Also, a big effort is ongoing to understand and reduce emittance growth on LHC Indiv and LHC1 beams.

Wednesday MDs: As announced a PS dedicated MD on the PFWs was carried out in the morning interrupting all beams for physics. No real improvement on the regulation could be achieved. In the afternoon some beams were slightly perturbed by the BGI MD. Signal can be measured without magnet but is lost as soon as the magnet is switched on. BI is investigating the issue. Finally the new B train was successfully used for RF and POPS feedback loops.

AD (Bruno Dupuy):

The AD had a good week with little down time (4h).

It was also the first week of the BASE experience (7H-15H).

Despite two sessions reserved for the injection of antiprotons in ELENA (Monday, Friday), the BASE experiment used many slots of times released by ATRAP and ASACUSA, to scan the beam line.

The intensity of the beam must be reduced to avoid alarming radiation during beam observation on BASE (line DE5) screens.

Beam interruptions caused by AD failures.

Element	Begin	Duration	Action
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DE5.DVT28 DE5.DVT33 DE5.DVT38 DE5.DHZ38	2017-06-20 09:58:04	3:30	Cannot swap to negative currents. Bad equipment configuration. - Solved by TE-EPC-CO support.
DI.QDE6010	2017-06-21 06:47:48	0:40	Pulse some time at current max. - Fixed by FistLine.
DR.QUAD	2017-06-21 06:47:48	0:10	- Reset by CCC Crew and FirstLine local intervention.
DE.BHZ7010-2	2017-06-22 07:31:05	1:42	Not beams for few hours but masked by ASACUSA RFQD breakdowns.
DR.SMI5306 Inj. KICKER	- -	$\Sigma < 0:10$	Reset by CCC crew.

SPS (Hannes Bartosik):

Week 25 started with a detailed investigation of the losses in the LSS2 extraction channel to the North Area. During the last weekend the losses and the spark rate at the electrostatic extraction septa ZS had increased notably with the high duty cycle of the high intensity fixed target beam. Together with experts from TE-ABT the losses could be reduced by about 50% on Monday after moving the ZS2 cathode out by 2mm. It seems that the extracted beam was partially intercepted by the cathode in the original alignment configuration. With a minor correction of the ZS1 cathode alignment and a beam-based realignment of the ZS girders on Thursday the normalised losses during the slow extraction could be brought down close to the reference levels from 2007.

The transmission in the SPS from injection to flat top is not yet optimal with the high intensity of $2 \times 1.5e13$ ppp injected. A test without core from the PS multi-turn extraction showed a reduction of the losses at SPS injection by about 50%, which might be linked to the fact that the horizontal emittance of the core as measured by the SPS bunch-by-bunch wire scanner is about 10 μm compared to about 5 μm for the islands. This needs to be further investigated together with colleagues from the PS. After some optimisation of the transfer line trajectories of the different islands the transmission in the SPS reached 92% in the weekend, despite the fact that the beam quality from the injectors is slightly degraded since Friday night to due to the missing C16 cavity in the PSB ring 3.

The BCMS beam was delivered regularly to the LHC as requested. On Tuesday afternoon the 200 ns batch spacing in the SPS was prepared and the MKP waveform alignment was verified. This batch spacing is used for the LHC fills since Wednesday afternoon without issues. On Saturday the LHC asked to reduce

the intensity from 1.16×10^{11} p/b to 1.1×10^{11} p/b following the beam dumps due to UFOs. To be noted that the LHC beams are still operated without feed-forward on the 200 MHz cavities, as there are still remaining issues to be resolved by the RF experts.

The dedicated MD on Wednesday was devoted to emittance growth studies in coast in preparation for the 2018 crab cavity tests. Unfortunately the afternoon of the MD was lost due to beam requests from the LHC.

Major downtime was accumulated mostly due to the injectors (about 14h in total). Furthermore the beam had to be stopped on Tuesday for 40 minutes for an upgrade of the FGC firmware of the mains and on Friday morning for 2 hours for an intervention on the 200 MHz transmitter TRX1 to exchange an amplifier tube.

LHC (S. Redaelli and M. Giovannozzi):

The intensity ramp up could be pursued up to 2460 bunches (new record at 6.5 [TeV](#)) for a peak luminosity of $\sim 1.52 \times 10^{34}$ cm⁻²s⁻¹ which is a new record (modulo uncertainty on normalization). The beam screen heat load reaches now 150 W in S12 for a limit of ~ 160 W.

Multiple events have now been observed leading to beam dumps on fast losses in IR7 (typically 10-20 ms risetime). Such fast time scales seem not to match what is expected from instabilities, therefore UFO like events are suspected. Strange losses are often also observed in cell 16L2, correlated to the IR7 losses.