

Accelerator Complex Status

End week 43 (Monday 30 October 2017)

TI (Jesper Nielsen)

Reasonably smooth week with a few events mostly towards the end of the week. Following the change from Summer time to Winter time, there were a number of different access issues reported during the early morning. The issue was signalled to the Access Piquet, who found that there was a table missing from the ADAMS database, resulting in a loss of synchronization.

The piquet had to manually recreate the table to re-enable the synchronization.

Details: <https://wikis.cern.ch/display/TIOP/2017/10/30/TI+Summary+Week+43>

LINAC2 (Detlef Kuchler):

On Tuesday a problem with tank1 started. A problem in the feedback loop which could be partially cured with some tuning but needs some time for a direct intervention. In the night to Friday a power glitch stopped some equipment. The reference amplifier needed to be replaced. 2h13min downtime.

Over the weekend the PSB suffered from unstable pulses for long beams. To be investigated today.

LINAC3 (Detlef Kuchler):

Beside the occasional trips of the source microwave generator there were no other problems. The intensity is around 30-35 μ A in BCT41. The stability is a bit better than the week before, but still not as good as in Spring of this year.

LEIR (Nicolo Biancacci):

Monday 23/10:

- Several trip of BHN30 required EPC intervention. Fixed by resetting the interlock and communication card controls.
- MD instability studies: observed coherent head-tail mode from the damper PU41. Observed also 200 MHz signal after capture till flat top.

Tuesday 24/10:

- Several trips of ER.KFH32. Investigated during the morning by specialist and team.

Summary of intervention:

"Some noise coupled on the main switch pickup triggered an interlock and sent the device into fault state. The capacitive pickup is on the main switch and triggered an open circuit detection. Some mask has been done in order to keep the KFH32 in operation. More work is needed during next stop as additional issues may come with detrimental effect for the HV cables."

Wednesday 25/10:

- Capture optimization + instability + resonance compensation studies.
- Two issues slow down the settings import from MDNOM to NOMINAL like cycles:

1. The damper settings (attenuation H and V) are not copied if not manually and with high intensity this is often forgotten until one realizes that we cannot accumulate more than 2 injections.
2. The settings for injection line of MDNOM, if copied, mis-steers the injection line: this might be due to some past current trim in the working set. It is recommended to always copy the EARLY settings for the injection line.

Thursday 26/10:

- Tests on the effect of IPM on the accumulated and extracted intensity. It was understood that the effect of IPM at full voltage is equivalent to a kick of ~ 200 urad. This can be compensated by DHV42.H corrector (the closest by).
- 10^{10} p+ peak accumulated intensity in LEIR achieved.

Friday 27/10:

- Compensated resonance $-Q_x + 2Q_y = 7$ by means of two normal sextupoles XFN11 and XFN32 on the MDOPTIC cycle with working point on the resonance. Continued on NOMINAL cycle with nominal working point.
- MDRF improved the Rf capture to have required bunch length for the PS (decreased modulation amplitude to 100 Hz).
- High intensity Xe now delivered to the PS on the NOMINAL cycle for PS EAST extraction and SPS partially strip ions.

Saturday 28/10 - Monday 30/10:

- Smooth operation with few trips from the RF Thomson quickly recovered.

(*) News on BHN10:

- Wednesday 1/11 at 15:30 there is an intervention in ETL.BHN10 to fix the ripple problem. Beam availability in LEIR will be affected. The intervention will be done during the SPS MD time.

PSB (Gian Piero Di Giovanni):

The week started with the scheduled beam stop on Monday to prepare the RP survey after the end of the NA proton run. During the stop, TE-EPC intervened to fix the systematic drift in AQN current on BT1.SMV10 with respect to the CCV. No drifting has been observed since then. Also the cables for the BLMs installed around BHZ502 to investigate R2 hotspot were connected and the investigation has started.

Most of the PSB downtime was caused by problems with the Linac2 RF on Tank1, on Tuesday, just after the restart of the beam and on Tank2, on Thursday night, when the Linac2 RF experts had to replace the Dressler module of the reference line.

On Friday at around lunch time we recorded un-usual losses of intensity at capture in R1 for intensities above 500×10^{10} p, thus affecting both ISOLDE and MTE beams. The entire crew (PSB operators, Alan, Simon, Bettina and myself) spend the whole afternoon investigating without finding any problem with both the PSB setting and equipment. As we could compensate the loss of intensity in R1 with the other rings for ISOLDE and NA physics stopped, we still supplied all users even in degraded mode.

In the week-end Win and Yu noticed a strange shape of the chunk of the L2 pulse injected in R1. This could be related to a L2 RF issue, maybe resulting from the problems occurred last week. The Linac2 RF experts have been notified and will investigate today.

During the week, special INDIV beams for future LHC special runs have been checked including the 4 rings VdM at $1.3E11$ ppb with $EH/EV = 1.5/2.0$ mm mrad and a request for LHC Roman Pot tests for INDIV $8-10E10$ ppb with as low emittance as possible, < 1 mm mrad.

ISOLDE (Emanuele Matli):

On Monday we profited of the planned proton interruption to commission XT02. Protons were back later than expected (18h) but the restart was quite smooth and we were able to give beam to the experiment within 1h.

We kept improving the settings of the linac to increase the (small) amount of Li delivered to the experiment during the week until the planned stop Thursday morning, followed by some energy measurements with Carbon.

The same issues experienced last week with RF cavity trips continued this week.

A new target was installed on GPS and we started preparing for the next HIE experiment .

On HRS a target was installed Monday and set up during the week.

Collaps had a bumpy start due to a series of problems: no He gas in RFQ, no protons from PSB, interruptions for interventions in HT room and Laser issues. From Saturday morning they managed to run reliably and took data almost uninterrupted during the weekend.

PS (Matthew Fraser):

It was another smooth week for the PS with the average availability at about 97%. The RP cool-down and beam stop schedule was respected from Monday morning to Tuesday afternoon, with the start-up delayed by about an hour due to kicker problems across various machines (LEIR, PSB and PS). Special LHCINDIV beams set-up in the PSB were delivered to, or prepared for set-up in, the SPS, including the multi-bunch VdM beam and a low emittance (0.5 μm injected, 0.7 μm extracted) and low intensity ($10E10$ ppb) version. The NOMINAL LHC ion beam (2b, 100 ns) was set-up in the PS and is ready for the SPS to take at about $6E10$ charges. The bug observed on the WR transmission of the B-train measurement appears to have been fixed on Tuesday by TE-MS-C-MM with no further missing POPS cycles, to be confirmed. The new B-train measurement system was also tested on clones of most of the operational beams with success. Very promising tests of the BGI in the PS were made in MD on Friday and set-up carried on for the high intensity MTE tests foreseen in the coming week.

AD (Lajos Bojtar):

We had very good beam availability this week, only with 2 hours downtime. The main problem of the week was shot to shot intensity

fluctuations . It was found after a while, that half of the stochastic cooling amplifiers were cycling between on and off with a frequency of about 0.5-1 Hz and there was no sign of any malfunctioning on the control system. After finding this we needed some time to readjust the RF system for a better recapturing.

After these the AD was running with the usual intensity of $3E+7$ pbars/shot.

SPS (Hannes Bartosik):

Monday morning marked the end of the successful North Area proton physics run in 2017 and the SPS started preparing for the primary Xe run. In the course of the day, the primary ion interlock and all related safety measures were put in place and the extraction of the Xe beam at 358 ZGeV/z was set up. Already on Monday evening the beam reached the T2 target and was ready for the secondary beam line physicists to setup for the experiments. On Tuesday evening, after the stop for the planned RP survey in the afternoon, the beam was also put on the T4 target and UA9 could start taking beam.

Since Wednesday night the users of H2 (NA61) keep reporting vertical drifts of the beam position, while the TT20 transfer line trajectory up to the T2 target seems stable. Despite investigations from both the SPS side and from the secondary beam line specialists it is not yet understood what is causing this drift. For the moment, the work around consists in vertical steering before and after the T2 target until the beam is found back in H2.

Apart from this, beam availability in the SPS was rather good with only minor interruptions. The biggest downtime was caused by a parallel MD cycle which triggered the primary ion interlock on Thursday afternoon. The DSO had to be called for rearming the interlock. About 2h were lost. Worth mentioning is that the ZS extraction septa suffered from high spark rates when the 8b4e beam is put into the sequence in preparation for LHC filling. After a few cycles, the spark rate is back to normal levels. However, the ZS tripped a couple of times during the weekend.

LHC filling itself went rather smooth. In addition to the normal physics fills with the 8b4e BCS beam, a special version of the indiv beam with 2x4 bunches was sent to the LHC for a 150 bunch calibration run requested by ATLAS.

The preparation of the upcoming AWAKE run was also progressing. Powering tests of the electron beam line as well as DSO tests were performed during the week.

LHC (Massimo Giovannozzi & Wolfgang Höfle):

Smooth operation with 8b4e BCS. On Sunday evening 44.8 fb⁻¹ had been delivered to ATLAS and CMS.

Thursday successful test of the high beta (100m) optics at injection with beam - basic corrections, optics, aperture. This test was followed by a special luminosity transfer fill (low to high pileup) with 150 bunches for ATLAS.

A longer stop had to be scheduled on Friday afternoon to exchange N2 bottles for the B2 dump. At the same time the cryo performed a filter regeneration in point 4 - no side effects due to that action.

In the night of Saturday to Sunday the LHC suffered like other machines and the rest of the CERN site from the access issues induced by the changeover from summer to winter time.

Good machine availability of 86.5% and stable beam time of 54.8%.