

Accelerator Complex Status

End week 32 (Monday 13 August 2018)

TI (Chris Wetton)

Rather good week.

Mon, 6 Aug at 07:30, The Septa magnets cooling circuit tripped in BA2 twice due to a user interlock. This was eventually diagnosed to be a spike in the vacuum of the MSe.

Mon, 6 Aug at 17:37, Following a fault on one of the supply pumps for the UW85 the LHCb magnet went on alarm. The one of the pumps for the UW85 cooling circuit went on alarm for a faulty starter, causing the second pump to switch on immediately. This resulted in a slight loss of flow/pressure during the switch over which generated a warning only on the LHCb magnet. The piquet CV was still on site and managed to resolve the issue with the starter very quickly.

Fri, 10 Aug 16:16, We lost the cooling circuits for BA81 due to what was initially shown to be a loss of 230V on both the TIM and PcVue synoptics. It was later diagnosed as a loss of cooling pressure from the North Area Cooling Towers. This pressure decrease was seen by all the North Area Cooling plants (BA80 - 82) but Only BA81 tripped. The circuit was restarted by the CV responsible within a few minutes, and following an investigation it appears that there may have been a micro-power cut that resulted in the pressure loss. TI managed to find an alarm from one of the UPS in the North area around the same time.

Details: <https://wikis.cern.ch/display/TIOP/2018/08/13/TI+Summary%2C+Week+32>

LINAC2 (Giulia Bellodi):

Linac2 operation went smoothly until Friday: beam was stopped for 15 minutes on Thursday morning for the exchange of a failing vacuum pump near the RFQ with a spare already installed. Then as of Friday morning the LI.CBU01 buncher cavity (located just downstream of the RFQ) started experiencing breakdowns, becoming more and more frequent with time. During these breakdowns the cavity amplitude dropped down to zero, and the RF pulses affected were being fully reflected back to the amplifier, thus causing degraded intensity of the beam transmitted, often triggering the watchdog to interlock the source. The occurrence of the breakdowns was fairly random, and not correlated to the user being played.

RF experts were called out at midnight on Friday and took turns on site all day Saturday trying to diagnose the problem. All HV connections were tested, as well as the amplifier and the cavity. Investigations were however not conclusive, and were suspended at 19h30 on Saturday.

Then at around 01:00 on Sunday morning, the breakdowns suddenly disappeared, and Linac2 operation came back to normal.

The cavity is being monitored and further discussion will be held among the experts to exchange ideas on the possible caused and preventive actions that might be taken next.

LINAC3 (Giulia Bellodi):

Linac3 had quite a good week, with a ~25uA beam delivered to LEIR.

Beam operation will be halted this week for the scheduled repair works on the GTS extraction system.

LEIR ():

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PSB (Alan Findlay):

A good week for the PSB itself, with no significant downtime, but we did notice a few “hiccups” in the beam coming from L2.

Late Friday evening Yu started to notice the beam was unstable for all users, and identified the problem to be around the LI.CBU01. Giulia was called for advice and suggested calling the expert Giampaolo, who was on site by 00H30 Saturday morning. A 3 hour intervention cut the beam but Giampaolo couldn't find the root cause and so suggested lowering the amplitude of the amplifier in the hope of stabilizing the situation.

By 07H30 the situation deteriorated and the LHC filling became a painful game of “hit or miss” with more misses than hits. Tibor called around for reinforcements and by 09H15 Giulia suggested the expert to call was Cristiano, who arrived and prepared the spare amplifier. There was then about 8.5 hours without beam while the L2 specialist team worked on the problem. By 19H30 and very miserable Saturday for the L2 team, the beam was back in degraded mode, with the hope that we could work until Monday like this.

As Saturday evening progressed, the situation continued to improve and by 01H30 the problem had solved itself, just as it had caused itself. The beam has been stable since, so I'll leave the L2 experts to explain that one.

In other PSB news, by Friday we had confirmation from Fulvio Boattini that the cooling problem that was limiting the number of cycles we could play in the PSB, had been identified as fans for the Quad active filter racks that were not switched on, but the reason for this was unknown. These were checked and put back into operation and the problem is thought to be resolved.

The Finemet reliability run was started on the ISOLDE users, replacing the 2nd harmonic C04 system on Ring 4.

A request for an MD cycle with an intermediate FT prompted Yu, Jean Michel and Gian Piero to revive the 1Gev cycle in the PSB. Although this hadn't been done for many years, they soon had a beam accelerated up to 1GeV and the cycle is now ready for synchronization and extraction setting up.

ISOLDE (Emanuele Matli):

it has been a quite good week at ISOLDE.

Since Wednesday evening we delivered [106Sn@4.4MeV/u](#) to Miniball, after setting up the separator and linac in the beginning of the week, while on GPS we installed a new target and did the first setup in preparation for the next HIE run.

Overall the machine was bit less stable than in the past week, with more RF cavity trips and a few failures of the target heating, on both separators.

The main beam time loss came from the Linac problem on Saturday.

PS (Klaus Hanke):

A good first part of the week and a perturbed weekend mainly due to Linac2.

Heiko recovered all our beams as they were before the big power cut and the subsequent LLRF issues. In particular the good performance in terms of intensity and stability of the LHC beams is still observed. On Monday the LHC could be filled again using the rectified LHC4 beam (LHC25#48b_BCMS_PS).

Throughout the week there were a number of resets of the RF and a few piquet interventions, but not causing any significant down time. There were also recurrent issues with F16.QDE217 which could be fixed by the specialist.

Since Wednesday C40-77 was not working and we were running without spare; only 40-78 was in use for three days, then the power supply could be fixed.

On Thursday there was a 10 min stop for a Linac2 intervention.

On Friday some issues with bad acquisition of the TMS could be solved by the specialist.

During the weekend Linac2 started to give low and instable intensity causing several hours of down time for interventions (1, 3 and 8 h) and a long period of degraded operation until Sunday morning 01:00 when the Linac recovered good performance by itself – problem not understood. On Saturday evening there was also an intervention of the piquet LLRF on the 10 MHz (pulse repeater changed).

AD ():

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ELENA ():

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SPS (Verena Kain)

The week started with a very good availability. But due to the issues with the LINAC2 debuncher on the weekend the overall availability was then finally only average: ~ 85 %.

HiRadMat experiment 37 SextSc was carried out on Monday. The short HiRadMat cycle was used for this experiment in the beginning which only allows for one

injection. Unfortunately the setting up of the damper (and 800 MHz) needs to be reviewed by the experts - the 24 bunch beam was unstable horizontally in spite of applying the usual tricks. The long HiRadMat cycle was used in the end and the experiment was finished successfully.

A new HiRadMat optics (beam size 4 mm, at focal point 3) was also commissioned in week 32.

During the dedicated MD on Wednesday the effect of the RF gymnastics parameters on the momentum distribution for slow extraction was investigated. A new tool is now available that calculates the momentum distribution from the tune function for a given chromaticity. The chromaticity measurement result from a few weeks ago was cross-checked indirectly with the new tool and COSE (constant optics slow extraction). A discrepancy of a factor of 2 was found in momentum distribution. Further investigations showed that the calibration/definition of the radial steering knob in LSA is not as was assumed in case radial steering is done through the radial loop (it uses the dispersion at the pickup and not the average dispersion - factor of 2 difference for Q26). Our automatic chromaticity measurement tools rely however on this radial steering knob. In the end the chromaticity is indeed -1 (or smaller) as designed (it was measured at -0.5 earlier). The measured momentum distribution was finally found to be $\sim \pm 1.5$ permille during the MD.

On Thursday access was given for a vacuum leak at 312 that had developed about a week earlier and did not stabilise. It was found at a pressure sensor at a venting port and could be "repaired" with varnish.

Several issues with FGCs and/or LSA were reported again. Re-mapping cycles with different particle transfers has lead at several occasions already to typically extraction bumpers play unwanted functions during a cycle with the result that the beam is lost during or the subsequent cycle. This needs to be followed up.

Otherwise the SPS was stopped for various small issues (power converters, RF,...). The longest down time was due to the LINAC2 debuncher issue with more than 10 h. It also caused bad quality LHC beam with the usual impact on LHC filling time and low intensity fixed target beam.

LHC (Stefano Redaelli & Elias Metral)

Monday rematching of the energy to the SPS at injection, corrected ~ 40 degrees on synchro loop on B2 ($\sim 0.01\%$ dp/p), ~ 10 degrees on B1.

A reasonable but not the best production week, as interruptions for accesses (EPC, QPS, MKI, BIS) and a bad Saturday for LINAC2. The production follows now closely the predicted performance with just over 4 fb^{-1} last week.

The plan is to produce for physics and some end of fill test are on the list.