

Accelerator Complex Status

End week 31 (Monday 8 August 2022)

TI (C. Pruneaux)

Details:

<https://wikis.cern.ch/display/TIOP/2022/08/07/TI+week+summary%2C+Week+31>

LINAC4 (P. Skowronski):

During last week we had only one fault in LINAC4: a driver amplifier for BUNCHER1 cavity failed and was replaced with a spare (downtime 1h 8 min.).

Previous week we reported a source issue that was occasionally pulsing with much lower intensity and it was cured with increased hydrogen flow.

Over this week it happened again on couple of occasions and increasing further the gas flow made it gone. The specialists need to investigate the issue and for this they request to stop the beam operation for 1-2 hours.

LINAC3 (D. Kuchler):

This is my report for the operation of Linac3 in week 31:

- The issue with the microwave generator Sairem2 could be fixed on Monday morning with the help of a colleague from CLEAR. In the end it was a problem with the connection of a SMA cable in the low level part of the generator. The beam could be re-established in the afternoon of Monday.
- As LEIR did not take the beam during the week, the time was used for MD's in the linac.
- To have a good performing source when LEIR will take the beam again it was decided to have today (Monday) an oven refill.

LEIR ():

No LEIR operation as no resources.

PSB (J.F. Comblin):

The availability of the Booster last week was around 95 %.

We had several problems:

- POPS-B tripped twice due to the Quad-A circuit. This problem is already known and followed by the specialist. The total downtime was 25 minutes.
- We had several short stops due to H0/H- interlocks. The reason is unknown and under investigation.

- Wednesday, the SPS complained that the MTE beam had a vertical emittance too large. A new beam with slightly smaller emittances was prepared and is being tested in the PS.
- Saturday during the night, we had unstable beam in ring 3 for MTE and Isolde users. The problem disappeared when Isolde stopped their request and came back when requesting the beam again. So, we decided to stop Isolde while investigating. Unfortunately, it took some time, but we finally found out that the 'not-yet-tested' turn-by-turn semgrid in ring 3 erratically sent external conditions that forced 1 turn injected in the ring 3. With specialist agreement, we disabled the protection of this semgrid. The total downtime for Isolde was 4h45.
- The malfunction of energy mode of the FGCs in the BTP line caused several radiation alarms in the PS injection region. We disabled it while the specialists are investigating.

On a positive note: the Isolde beam at 1.7 GeV was finalized and new optics uploaded; EPC successfully tested the BVT.BVT101 and BTY.BVT116 power converters at higher current. Everything is now ready for the 1.7 GeV tests starting this Monday.

Otherwise, we provided the usual beams for physics and MDs..

ISOLDE (S. Mataguez):

On GPS, the experiment IS710 finished on Wednesday morning.

Some collections on GLM on Wednesday once IS710 finished. From Wednesday, the week was dedicated to TISD MD (target development).

Two target changes, one on HRS on Wednesday and one on GPS on Friday.

Beam set up from HRS to the tapestation. Beam set up from GPS to the tapestation and LA1.

During the weekend we took protons with the 1.7GeV tune scaled down to 1.4GeV. From today the PSB will start testing the tune with 1.7GeV.

Investigation for the GPS Separator magnet stability is ongoing. Tuesday the magnet experts came to diagnose. Their last idea is to replace the teslameter or the magnetic probe. Not exactly a blocking issue as users were taking beam. We want to get to the bottom of this as it might be the start of something.

We are also in contact with EPC.

PS (A. Guerrero):

The PS machine had a fairly good week where the main down time came from the injectors. Other than that, PIPO had to be called twice to restart the injection septum due to an FGC issue during the weekend with a total down time of

approximately 2h30. Also, EAST beams were stopped during one hour following a recurrent radiation alarm in EAST area. RP piquet was called and the monitor producing the alarm was found to be in fault and thus disconnected from the system for maintenance on the next day. SPS beams were affected by a fault in the SPS RF train that lasted around 1h.

During the weekend several radiation alarms were produced due to an injection problem that was finally tracked to the ECO mode in the BTP line. For the time being and in agreement with the PSB supervisor the ECO mode has been disabled for all the line. Also at extraction, alarms are triggered from time to time due to missing KFA71 pulses. ABT continues to search for the source of the issue.

On the positive side, MTE could be delivered again to SPS and with higher intensity after the 10MHz cavity trip issue was solved last week. Currently, the SPS is taking $\sim 2250e10p$ per injection. Now, work on the injection is on-going to provide the requested low emittance MTE beam already delivered by PSB.

The intensity has also been increased for the TOF parasitic beam up to $400e10p$. Also on the TOF beam, a new cycle providing a 28ns extraction beam has been prepared.

AD/ELENA (P. Freyermuth):

This week was particularly calm.

Wednesday MDs went well, with target specialist re-scanning the target longitudinal position with an increased horn current. The horn current was pushed beyond operational limits by the specialist, in agreement with the power supply expert. We put back everything to normal after the MD. RF experts also took the opportunity of the MD to work on ELENA double harmonic deceleration. Later in the week, RF also worked with the H- cycles.

During the weekend, the main quad power supply tripped, the first line piquet was called and beam conditions returned. All this handled by PS crew. There were losses in the TT2, and PS team started to re-steer the line. However they were concerned about the implied changes on the beam position on the target. So they wisely rolled back and decided to wait some discussions on Monday.

SPS (F. Velotti):

The SPS week started with the intervention for the replacement of the TBIU. Apart from that, no significant stops were recorded, except for intermittent issues, like cavities and MKP.

The TBIU intervention went much faster than anticipated and by Monday afternoon the beam was back already to start the commissioning of the new instrumentation target box. A misalignment of about 1 mm was measured in the vertical plane (impossibility to move it remotely as motor only available in the horizontal one) with beam in a few different ways and finally confirmed also by the survey team. After

discussion with all the expert from the different groups, it was decided to realign the TBIU in order to avoid the possibility to request an intervention later in the run where the dose would have been much higher. Finally, though, after reaching out to the equipment responsible from BI, such intervention was strongly discouraged and we decided to move the target head and the BSM to compensate for such an offset. This allows normal operation with secondary beam

to H2 and H4, and it should also be fine for primary beam, but this has to be confirmed with beam, before ensuring that the new positions and angle on the target are compatible with this mode of operation. A test will be organised in the following weeks.

On the inspection side of the damaged TBIU, a weak spot in terms of vacuum tightness was found in the bottom half of the upstream window. Further analysis is still ongoing.

Expect that, the week was rather calm and very high intensity extractions from the SFTPRO were possible with only minor interruptions. At the moment of writing we are extracting $3.95e13$ ppp delivering the requested intensity on all targets (T4 was reduced following NA62 request).

The main other issues we faced were:

- cavity 4 frequent trips were contained reducing the voltage limit, and the same was done on cavity 1 when the total voltage on SFTPRO had to be increased to deal with the increased intensity
- the increased intensity also called for a review of the transverse damper settings. Once adjusted, transmission through the cycle could be improved and brought almost back to before
- also the emittance from the PSB was slightly reduced to improve losses at injection, but this translated in about 5% higher losses in TT20. The intensity increase also translated into a larger emittance and finally we are back to nominal normalised losses
- longitudinal blow up on the LHC was reduced, but it could not be fully removed as the beam was unstable
- Over the weekend, an intermittent issue on the MKP was seen. Finally the ABT piquet replace the trigger power supply and solved the issue.

LHC (J. Wenninger):

The first and third 1500b fills of the week with 192bpi were dumped by UFOs in 29R1 (twice same location). S23 had a 4th training quench during operation on Wednesday morning, just before the weekly access. After the access the number of bunches was increased to 1935b. Another UFO in 12R1 dumped one of the first 1900b fills.

On Thursday, the optics was measured in the ramp, and K-modulation was performed in IP4 at injection and at FT ($\beta^* 1.33\text{m}$).

In the night of Thursday one of the klystrons of RF module M1B2 tripped multiple times on crowbar. The RF group investigated in Friday afternoon, and the current of

the klystrons and therefore the power of the line was reduced. As a consequence, the number of bunches was not increased to 2100 as planned before the weekend but kept at 1900. Unfortunately, the first three fills of the weekend were again very short, two dumps on UFOs in 8R3 and in 33L2, one on a QPS fault on a RSF that required an access. The situation improved then with longer fills and still very fast turnaround. The beam screen heat load in the highest sector (78) peaked at 190 W/hc over the weekend with $1.2E11$ ppb. Unfortunately, an electrical perturbation dumped a fill Sunday evening at 18:10, with quench heater firing on IT L1 and R8 as well as on IPQ in R4 and S81. Cryo conditions were lost in S45 and S81 as well as the corresponding triplets. Roughly 10 minutes after the event, training quench of RB56, apparently uncorrelated to the electrical disturbance. Conditions were only recovered in the early morning of Monday.

Following the quench in 12R1 indicating that the diode of the dipole is OK, the BLM thresholds of cell 12R1 were increased on Friday by a factor 3.

UFO dump count: 16, UFO quench count: 1

Training quench count in 2022: 4 x S23, 1x S34, 3 x S56, 1 x S81