

# Accelerator Complex Status

## End week 27 (Tuesday 9 July 2018)

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### TI (Jesper Nielsen)

An eventful week with many electrical glitches.

Details: <https://wikis.cern.ch/display/TIOP/2018/07/02/TI+Summary+Week%2C+27>

### LINAC2 (Giulia Bellodi):

Linac2 has been running well all week, except for the electrical glitch on Thursday morning, which brought it down for a few hours.

The LI.SN01 solenoid power converter needed a piquet intervention to be restarted, and the LT.BHZ20 FGC magnet was found to have lost its settings, thus blocking operation. Beam was back mid-morning after the two problems were fixed. The overall beam availability for this week was 97.8%.

### LINAC3 (Giulia Bellodi):

Linac3 had also quite a nice week. Due to a couple of overnight power glitches, the source had to be restarted in the morning on a couple of occasions, but good beam intensity and stability was recovered soon after. An oven refill took place on Thursday as scheduled, and the restart was particularly swift. The source however went off on Sunday morning because of a broken filament in oven1, and operation is currently being resumed starting with oven2.

### LINAC4 (Silvia Schuh):

Linac4 continues to be in Extended Technical Stop.

Current work:

Cabling for moving the arc detectors to the surface is continuing - on schedule.

### LEIR ():

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### PSB (Bettina Mikulec):

This was one of the worst weeks of the PSB this year - our availability was only 84.5% compared to the usual ~96-97%.

Practically the whole time could be attributed to problems with the extraction bumpers **BE.BSW14L4**.

There were already a few trips of BE.BSW14L4 the previous weekend and an intervention of the piquet related to a contact issue of the 3-phase contact. Then Tuesday at 20:54 it tripped again, and the piquet together with three ABT specialists changed almost all hardware modules of the bumper throughout the night. On Wednesday 07:35 operation could finally be re-established. Further investigations in the lab by the ABT specialists seemed to indicate that the fault was located at the level of the PCU (Power Control Unit) introducing spurious glitches on the three

phase distribution to the CCU (Charge Control Unit) and damaging (i.e. not breaking) the CCU. The intermittent fault on the PCU was identified, being located at the level of an internal low voltage VERO power supply generating spurious transients on the +12V. Unfortunately on Sunday at 15:20 BE.BSW14L4 tripped once more, supposedly after a synchronisation timing issue from the PS. The piquet had to reset the circuit breaker. After a few minutes it tripped again and the piquet replaced the PCU, but this fix didn't hold long. **The final diagnostics is that the fault is located in the three phases connector from the EN-EL switchboard, which is powering the generator. There was one bad connection on the R phase in the connector powering the PCU. In the meantime this connector has been re-screwed, but it is important to replace the connector as soon as possible (1h stop)** and to redo properly the connection, as the cable has most probably been damaged due to arcing when pulsing, also damaging in return the VERO power supply in the PCU last Tuesday. All in all ~14h of downtime due to this fault.

#### Other faults during the week:

- Monday: Circuit breaker EOD111\*25A related to the WIC interlock rack RA353 tripped with a temperature fault, which as consequence tripped the MPS. The MPE specialist cleared the fault and beam was back 40 minutes later.
- Several power glitches during Monday and Wednesday night led to an accumulated downtime of <1h. Another glitch on Thursday morning took 2.5h for the PSB to return to normal operation (several piquet interventions).
- The BLM in section 5 (superior) is out of order. An access is required. It was also found that the intervention during ITS1 for the last BPM before the dump was unsuccessful.
- Thursday 23:10: Radiation alarm after a few vacuum pumps had stopped, leading to an interlock of the PSB extraction and recombination septa. At the same time BT.BHZ10 tripped, and the piquet had to replace the IGBT (4h downtime).
- On Sunday a few trips of the extraction kickers due to bad synchronisation received from the PS.

On the bright side there was good progress with several machine studies, the Finemet reliability run and the commissioning of the new Transverse Feedback system.

Hopefully better weeks to come...

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

The PS had a busy week, with beam availability around 82%.

- Since the radiation level on RP monitor (PAXP502) had been increased again since Sunday evening, it was presumed that the vacuum window in the East line that had recently been changed was broken again. An access on Tuesday morning revealed that the window was not ruptured but had only two hot spots. It was anyway replaced with a 175µm Mylar window, after a first try with a 100µm aluminium window broke from the vacuum pressure. The radiation level went clearly down again after the change. This caused 1:45 downtime for all beams plus 0:30 for the

East Area.

- The PSB extraction bumper caused 10 hours downtime in the night from Wednesday to Thursday.
- Power glitches on Thursday caused problems on cooling circuits that interlocked power converters in FTN and SMH57 causing 5:30 downtime.
- BT.BHZ10 in the PSB caused 4:45 downtime
- An OASIS crate power supply in cfi-353-cpaos6 tripped the electrical distribution and caused that many RF crates lost power, resulting in 3:30 downtime.
- Another 1:30 was lost due to a PSB extraction bumper problem.

On the positive side, there was a large MD activity in the PS, and various MD beams for the SPS (High Intensity BCMS, 50ns with 12, 18 and 36 bunches, a 16-bunch beam for HiRadMat) were prepared.

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

It has been a quite busy week at Isolde with some issues caused by the storms at Isolde and Booster.

On Tuesday afternoon and after the storm the HRS90 separator power supply tripped and could not be recovered. First line and Nicola David had to replace one electronics card (fault detection card) after some investigations.

Booster was down also for some time due to a problem with the MPS caused also most likely by the storm.

LA1 and IDS took different Bi masses from HRS. GPS was on stand by during the week and new target was installed on Thursday for the first HIE-ISOLDE run that will start this week.

### **AD (Pierre Freyermuth):**

AD down time during the previous week was dominated by electrical glitches that principally impacted the AD injectors. For the AD itself, we needed the first-line on Thursday and Friday to fix a broken power-supply, but in general AD seems a bit less sensitive to power cuts (as long as the electron-cooler filament is not powered down).

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

It was a great week for the Pbar in ELENA but not for the Hminus. The first Ecooling was observed on the intermediate flat-top. Beam was re-bunched and kept until the middle of the next ramp.

More details:

RF DEBUNCHING - BUNCHING: New DPS code was provided by the RF specialist in order to handle the restart of phase and radial loops after they have been frozen at the end of the previous segment.

Ecooler setting up: After adjustments we seen the first effect on the Pbar beam.

[http://elogbook.cern.ch/eLogbook/event\\_viewer.jsp?eventId=2607594](http://elogbook.cern.ch/eLogbook/event_viewer.jsp?eventId=2607594)

[http://elogbook.cern.ch/eLogbook/event\\_viewer.jsp?eventId=2610591](http://elogbook.cern.ch/eLogbook/event_viewer.jsp?eventId=2610591)

Playing with the bump in the ECooler the effect of e-cooling on the Pbar beam was improved and we managed to get very good signal up to mid of second ramp.

Hminus source: same story has we have had last week. It is difficult to keep injected beam in ELENA. The beam position is fluctuating cycle by cycle. We cannot manage to send beam to Gbar.

Found that the H & V plane and +/- of the BPM.432 are inverted.

New version of the Beam Request Server was deploy in order to increase the cycle repetition.

Tomoscope is triggering erratically. OASIS card has been replaced.

Of course, orbit and tune measurement during the cycle were done several time during this week.

### SPS (Karel Cornelis)

A black week for NA physics this week due to several long stops coming from different causes.

The splitter BLM saga:

Tuesday morning the splitter BLM's stopped because of a short on the high voltage line to the detectors. The HV generator was changed but it tripped also. However, after some time the short disappeared and the BLM's were functioning again.

Balance 2h45 downtime.

Thursday evening the problem with the splitter BLM came back. This time the short did not seem to disappear and the decision was taken to let TT20 cooldown for an access on Friday (NA was anyway off due to another problem with PC-data bus). On Friday morning a robot was sent in to do a radiation survey of the splitter zone and to take pictures of the HV cable patch panel in view if a possible intervention to localise the short. In the meantime an attempt was made to burn the short with capacitor discharge and/or detect the location of the short with pulse reflection. During preparation of all this, the short disappeared again and the decision was taken to reduce the voltage of the generator from 800V to 500V.

Balance 20h30 downtime

On Saturday morning the short came back. Instead of leaving the NA off for the weekend it was decided to try and work with robust power supply 70V 3A, instead of the low current HV generator (37mA). The BLM's gave a reasonable signal in this mode and we decided to continue the weekend like this. During the week a better adapted voltage source should be found (3A is perhaps a bit too much).

Balance 4h00 downtime

TOTAL 27h15 downtime to NA due to splitter BLM's.

### Data bus NA power convertors

The night from Thursday to Friday there was trouble with current reading of NA PC's resulting in interlocks. The problem was traced back to the parallel data bus which had to be checked out. Diagnosing an error on this bus is lengthy. The error was only detected and repaired on Friday morning.

Balance 16h00 downtime to NA of which 12h00 shared with the BLM problem.

### Thunderstorms

The night from Wednesday to Thursday, SPS suffered two glitches, one at 00h20 and one at 6:30. The first resulted in 30min downtime, mainly due to re-establishing cavity one. The second glitch effected mainly MPS and RF power, both of which a piquet intervention was needed. SPS was back at 8h00 but the injectors took until 10:25 to be up again.

Balance 4h downtime.

### Injectors

Tuesday night 9h were lost due to an extraction problem in the PSB. On Sunday afternoon the problem came back. There were also synch problems between PSB and PS around the same time.

Balance 5h20 downtime.

### ZS

An increased spark rate was observed during the 50nsec fills, although the intensity was only 7 to 8e10 per bunch with 4x18 bunches. On Friday evening an increased spark rate was observed with the FT production super cycle. The duty was reduced in order to ease the situation. Saturday ZS went down due a spark train interlock caused by ZS2 sparks. An expert was called in and the ZS was reconditioned to 250kV. Since then is working again, but we still run with a reduced duty cycle.

Balance 3h Downtime

Finally some good news. The 100nsec and 50nsec could be used by the LHC which was very pleased with our beams.

On Wednesday the dedicated MD time was used by 4 MD's in parallel. In spite of complexity of this operation, all MD's gave nice results. The Pb81 cycle could be commissioned with extraction included, and is ready for LHC. On the ship cycle a 'pulsed' slow extraction was successfully tested and a horizontal beam profile was observed with the gas ionisation monitor.

### LHC (Elias Metral & Markus Zerlauth)

The week was dedicated to the Special Physics run that was supposed to end by Wednesday but that was extended by 4 days due to some technical issues and the complex physics program that required slightly more time than anticipated with 77 loss maps requiring 14 cycles. On Saturday the last special runs fill with 50 ns beam was dumped at 14:02.

When going back to the standard 25 ns physics and with ALICE in positive polarity the losses went up to 93% of the BLM threshold on running sum 12. These are losses on the TCLIA which create shower on the TCT. For the moment ALICE can run with

negative polarity, but later in the year they will request to run with positive polarity. It would therefore be good to understand and solve the issue.

Today the abort gap keeper will be re-adjusted to allow for 2556 bunches (instead of 2460) for luminosity production. Also the BSRT calibrations is required as well as the repair and validation of the ALICE dipole.