

# Accelerator Complex Status

## End week 33 (Monday 17 August 2015)

### TI (Peter Sollander)

The three major faults last week were the SPS transformer trip (we don't have a spare for the coming two weeks) and the PS ventilation problem that stopped the machine for six hours and a demi water problem on sector 23 that lost 2 hours for the LHC and left it without a spare pump.

The detailed overview can be found at:

<https://wikis.cern.ch/display/TIOP/2015/08/17/TI+summary+week+33,+2015>

### LINAC2 (Giulia Bellodi):

Linac2 had a very good week with 100% beam availability. Average beam intensity at the end of the Linac is around 145mA.

### LINAC3 (Giulia Bellodi):

At Linac3 too it was also a week of smooth operation. The source provided fairly good stability and intensity throughout the week .

A source trip occurred on Friday afternoon, requiring a reset of the RF Thompson generator and of one source solenoid. Beam was cut for ~1/2 hour.

An oven refill is taking place this morning..

### LEIR (Maria-Elena Angoletta):

Very intense week for LEIR.

The RF capture and acceleration optimisation for NOMINAL was started and will be hopefully completed next week, after the electron cooling optimisation.

Electron cooling optimisation MDs were carried out on Wednesday 12 and Thursday 13 August, managing to increase the electron-beam current in the LEIR ecooler from 210 mA to 420 mA.

On Thursday BI has modified the slope correction on ITH.TRA41, which should now give a more realistic reading. BI are still looking into improving the algorithm for this.

The LEIR supervisors have organised a brainstorming meeting between the LEIR supervisors/coordinators and various BE experts, aimed at collecting ideas on how to improve and make more reliable/repeatable the injection efficiency. The meeting took place on Wednesday 12 August afternoon and provided interesting ideas for measurements in both LEIR and Linac3, which have already started to be taken.

Finally, it was agreed that the Linac3 source refill would take place on Monday 17 August morning. The beam will be left to Linac3 people for MDs until Tuesday at lunchtime and will come back to LEIR on Tuesday afternoon. TE-ABT will also profit from this LEIR stop to inspect the KFH32 element, instead of waiting for the next technical stop.

## **PSB (Alan Findlay):**

Rather a good week for the PSB, with the only problems being RF related, so proof that I should now go on holiday!

A bad contact in the RF distribution to the R3 C04 cavity took us just over an hour to find on Thursday, but once everything was tightened up, it was business as usual.

The LHC\_BCMS25\_A & B were tested with the PS ahead of the request for the following week and all is within spec.

The usual busy MD program continued all week, with transverse shaving, hollow bunches, Finemet (any way you like it) and injection BPM fluctuations all under scrutiny. We had a couple of issues for the Finemet MDs, as the installation of new HW and software in the spare R0 beam control that is required for the next step was less than transparent, but we solved or worked around these problems throughout the week.

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

### **GPS**

Tuesday:

Target change.

Issues found:

-Difficulties to cold down the target line as the power supply was not following the CCV.

-During the target change it was noticed that the FE extraction electrode was not moving properly and could not reach the out position. Electrovalves and air compressed were checked but no clear problem was found so it was decided to send the TELEMEX robot the day after to check the FE.

Wednesday

The TELEMEX robot was sent into the GPS frontend and confirmed that the problem was related with the transmission of the movement between the motor and the extraction electrode itself.

An intervention has been planned for next Monday to check/repair it.

### **HRS**

After the installation of a new target on Wednesday it was confirmed that the problems we were having with the FE shutter were coming from the target installed and not from the FE itself.

A new target was installed without problems and the shutter tested several times.

Beam setup on Thursday (85Rb/30 kV) followed by proton scan and RILIS setup.

Some target yields on Friday and beam available for users (COLLAPS) after.

Machine running smoothly during the weekend and users taking 40Ca , 48Ca and 52Ca.

### **OTHERS**

On **Wednesday** at 15:55 we had a cryogenic incident at the HI-ISOLDE cryomodule. The small rupture disc broke and He escaped from the He tank inside through the chimney into the hall.

Investigations why and how are ongoing.

Isolde was immediately evacuated after the large bang and He release. Also informed immediately the fire brigade who blocked the roads around ISOLDE and kept parking and access points free.

No people left in the ISOLDE hall.

Fire brigade investigations on the roof and later inside the tunnel (opened by ISOLDE OP (Erwin & Alberto)).

The amount of He and the flow towards the roof into the large volume of the hall made that there was no oxygen deficiency alarm.

Hall and facility were given free access again by the fire brigade around 17h.

Cryogenics and CM specialists sur place as well as safety delegation.

Investigations and conclusions ongoing.

### **PS (Ana Guerrero):**

On Monday a problem in the ventilation of the central building produced an erratic cavity pulsing. The cavities only recovered after the reboot of a crate generating the h256 clock for the AVC loop. The beam was down during 6h. The rest of the week was fairly good for PS.

From already over a week the 200MHz cavities have been tripping very often. On Thursday, following a dephasing issue of the SFTPRO beam injection into the SPS, all problems could be finally fixed. The 200MHz cavities were driven to the maximum RF voltage but the voltage could not be detected due to a local oscillator pulsing with a lower frequency. The exchange of the local oscillator solved both the high and low level issues.

All operational beams were delivered. Special care was put into delivering the maximum possible intensity (between 160 and 166 p/s) to nTOF to complete the current sample run which has generated a few more radiation alarms than usual as the surveillance had to be stopped.

This week the work has concentrated on setting up the PS extraction and transfer to SPS of the MTE beam on one hand, the optics in the F16 line for MTE are now the same as the CT beam. And, in reducing the emittances for the LHC beams, on the other. Currently, both 12 and 24 bunch LHC beams have emittances in the order of 2.8 and 2.6  $\mu\text{m}$  for the horizontal and vertical planes respectively. A beam with flat tunes of .22 and .25 in the h and v planes, and almost null chromaticity has been prepared. Emittances can be thus reduced to around 2-2.2 $\mu\text{m}$  per plane.

### **AD (Lars Joergensen):**

It was a fairly good week for the AD.

Monday afternoon the spare power supply installed for DI.BHZ6034 temporarily installed over the weekend was replace for the repaired original and the EIS chain was then back to normal. This cost one hour of beam time.

Tuesday a strange access condition error occurred in the ATRAP area with the beam imminent light starting to flash while the zone was open and they were working there. When they went outside the zone the access door was showing the zone to be closed although the door was open. After about 2 minutes the access system re-set itself and was back to normal. Needless to say, this alarmed the people there somewhat. It was later established that this was due to a software glitch specifically for ATRAP (i.e. not affecting other zones) that has since been resolved.

Wednesday the AD lost some hours of beam to the PS MD.

Thursday saw severe problems with the C02 cavities. After some investigation it was established that this was due to a power supply. Further investigations on Friday led them to apply a filter to this power supply. This made the frequent fall-out of the cavities go away, but they still caused beam loses from time to time. It was observed on a couple of such occasions that the unit does not appear to receive the program cycle correctly. This is still being investigated.

The C02 cavity problems was the main culprit behind the supervisor being called to investigate beam position and intensity fluctuation observed by ALPHA during the night between Thursday and Friday.

Friday was a bad day for the AD with the C02 cavity problem continuing to cause troubles until its partial resolution late in the day. Furthermore the ejection kickers were down for 2 hours in the morning in an un-resettable fault.

During the night from Friday to Saturday ALPHA again call to request help with very poor beam conditions with many shots lost. The C02 program problem was probably partly to blame for some of these problems, but we also find a ring trim supply faulty. After FirstLine fixed this the beam becomes acceptable for ALPHA.

The rest of the weekend passed without further incident though with gradually lower ejected beam intensity such that the average ended at about  $2.5E7$  per shot.

### **SPS (Django Manglunki):**

Not a great week for the SPS. At the time of writing the North Area cannot be delivered beam due to a vacuum leak near T6 in TT20. The LHC beams however remains available and are performing well. The BCMS beam was tested with 48 bunches on Friday and studies on the MTE beam are progressing.

On Monday 10/8 morning, at 10:00, the mains tripped twice due to a compensator problem; once this was solved there was a failure of bend2 of Target T4 (NR22-001), totalling 3 hours of beam down time.

Tuesday 11/8 started with 6 hours beam down time due to an RF problem in the PS. Then, during the morning, a team from EN/MEF accessed TT41 for AWAKE installation, leaving the material door open for a long time, mobilizing the shift crew in front of the access console. It turned out this was not supposed to be a one-off

but that such installations had been planned for one month. The DSO has since established a procedure, similar to the "Blind access" which exists at the PS, where one person is locally responsible for checking the accesses.

On Wednesday 12/8, during the dedicated PS MD on the dummy septum, the BA3 pump for RF cavities was fixed by EN/CV, while EN/EL repaired SMD4 and placed it back in the configuration.

On Saturday 15/8 at 21:20 the North Area beam was stopped by a vacuum leak in the T6 area. The reason could be traced by a wrong current sent to MAL2512 by an autopilot, although the angle computed was correct. Apparently the LSA correspondence between angle and current has been wrong for that particular trim. During the leak detection which took place on Sunday afternoon at 17:00, the target area was found flooded, see pictures below. The area is still very hot (~24 mSv/h near the window). A meeting is planned on Monday at 9:00 in the CCC to organize the various interventions.

Finally, it should be noted that at many occasions, calls to GSMs did not go through, and were answered by a message from the french operator Orange, informing that "ce numéro n'est pas attribué" (sic)..

### **LHC (From the 8:30 meeting):**

Following a rather difficult week the LHC had a fairly good weekend with 10 fills starting with 86 bunches then 158 and last 218 bunches. The next step will be 288 bunches. Unfortunately only 1 out of 9 were dumped by OP the others were due to a UFO on Friday, false BPM on low intensity, Quench, and RF.

The luminosity is presently about half the design luminosity  $5E-32$ .

The witness bunches (bucket 0 to about 120) in beam 1 blow up transversely along the 12 bunch train, but also when replaced with the LHCINDIV.

The emittance at injection is 2.5 to 3.5  $\mu\text{m}$  and in collision they are around 3.5 (deduced from luminosity).

Leaving the witness bunches out by-passed the emittance problem, but this remains to be understood.

The abort gap cleaning was switched on and seems to be ok for the beam, It remains to be verified if it working correctly.

Further intensity ramp up foreseen for this week.