

Accelerator Complex Status

End week 43 (Monday 26 October 2015)

TI (Jesper Nielsen):

Monday:

- A high pH was detected in BA2, it is not clear what caused the spike.

Tuesday:

- CRYO lost communication with a PLC in LHC8, sector 7-8. Caused 7h and 43m of downtime of the LHC. The CPU was changed and loaded with a new firmware that should avoid stopping the installation if the communication is lost again.

Wednesday:

- CRYO conditions lost, due to a low level in the DFB. 1h and 35m of downtime of the LHC and BA2 water station tripped when switched back to AUTO after restarting the circuits. Investigations are ongoing with equipment specialists.

Thursday:

- CRYO conditions lost in LHC 8, due to a low level in the DFB and after in LHC4 after a problem with a valve on the turbine.
- BA5 demineralised water station tripped, the fault was a leak warning. Dalkia technician was already on-site working on something else, making the restart quick.
- TT10 Cooling station in NA62 regulated wrongly and caused problems for ECN3. TI left the pump in manual for the night, which was later decided to be left like that until next TS.
- Report from SPS eLogBook: "ECN3 called us because they complained about the K12 TAX cooling surveillance (P0 survey) that was in alarm many times. Every time, they had to wait more than 30 minutes before having the possibility to move it.

Saturday:

- Beam lost in nTOF, due to temperature problems on the water cooling. Still being investigated by specialists.
- All communication down for detector cooling in ATLAS. Same problem as what happened [some weeks ago](#), where a special firmware was installed in the PLC to detect more in details what happens. Hopefully this will allow to further investigate. Being followed up in the TIOC meeting.

Detailed report can be found at:

<https://wikis/display/TIOP/2015/10/26/TI+summary+week+43%2C+2015>

LINAC2 (Jean-Baptiste Lallement):

An RF tube had to be replaced on the buncher2 on Monday afternoon. An access to the tunnel was given in parallel to the vacuum team to check Tank2 vacuum pumps: 1.5 hour beam stop.

A faulty module linking the RF and access systems caused an RF stop on Sunday afternoon. The module was changed: 3.5 hour beam stop..

LINAC3 (Jean-Baptiste Lallement):

The ovens were refilled on Monday. After a difficult source setting-up. Beam was delivered to LEIR from Tuesday afternoon. Since then, pretty good week with some usual resets and source tuning to recover the intensity drops that occurred over the nights.

LEIR (Michael Bodendorfer):

Tuesday afternoon M. Meddahi announces the LEIR crash program which will reshape the LEIR operation for the rest of the week.

Wednesday: We deliver beam to the PS/SPS for their MD. The LEIR crash program performs parallel MDs on LEIR. V.Kain develops a successful prototype of a tune corrector application for LEIR which is tested and constructively used right after.

Thursday: NOMINAL is accumulated much less than the day before. Reason is partially due to the reduced ion beam current delivered by the Linac3/GTS ion source.

avg. MTR12 (@ extraction) = $2.3E10$ charges, std-dev MTR12 = $0.2E10$ charges

avg. ITF.BCT25 = 0.017microA , std-dev ITF.BCT25 = 0.0037microA

D. Kuchler works on the GTS ion source to increase the Linac3 output (currently around 12 to 15 microAmp). He achieves his goal to return to the previous Linac3 beam intensity in the afternoon of Thursday. 22microA LEIR extracted intensity: $3.5E10$ charges.

Friday: PS and SPS take the NOMINAL beam. LEIR intensity at extraction is the same as on Thursday: about $3.5E10$ charges. PS complains about non-equal trajectories of incoming bunches within one NOMINAL cycle. We discover the extraction kicker features a noisy slope rather than a more-or-less flat top. The expert declares that this is normal. We see on the BPM in the ETL line for the outgoing beam to the PS, that the beam position does not fluctuate between two bunches from LEIR within the same NOMINAL cycle. Hence, this cannot explain the non-equal trajectories observed in the PS.

* MTR12: $\mu = 3.495E10$, $\sigma = 0.4317E10$ charges (12.4%)

ITF.BCT25: $\mu = 25.15\text{ microAmp}$, $\sigma = 2.56\text{ microAmp}$ (10.2%)

The LEIR crash program reports their first findings in a short meeting.

<https://indico.cern.ch/event/457384/>

Weekend: the LEIR machine has continued to perform during the weekend without significant problems.

PS Booster (Bettina Mikulec)

Good week. Lots of activities, optimisations and MDs; very little down-time due to the PSB.

Main issues from last week:

- Ring 4 transformer was not working properly. Solved on Thursday.
- INCA server reboot, as the control system got stuck. More diagnostics added.
- Several resets and interventions for BTY line magnets throughout the week (POWM1553 class).

- Synchronisation problem (wrong beating frequency) shows up from time to time, and beam from ring 4 gets lost in the line. To be followed up once the specialists will return to CERN.
- The shaver power supplies (POWM1553) have occasional bad shots where the beam gets lost in the rings. An EPC issue has been opened. On another POWM1553 EPC issue (BT.QNO50 taking a new CCV value only after a few shots) work has been done, but since months no solution.
- Saturday evening the TOF beam was cut by SIS due to a failure of the related BCT in the PS. Bypassed SIS for the duration the PS BCT got repaired (no intensity change during this period).
- No extraction pickup acquisitions from Saturday evening until Sunday 11am, when the BI specialists could solve the problem.
- On Sunday at 4pm the Linac2 RF tripped and couldn't be restarted due to a Tunnel Veto. Problem with the PLC of the RF system that feeds back it's status to the access system. The specialists could only intervene a couple of hours later. Finally a module had to be exchanged. 3.5h downtime.

MDs and optimisations:

- Prepared the most challenging beam for HiRadMat (7 different beams requested) —> OK.
- Continuing the measurement of the PSB brightness curve.
- Hollow beam MD continued.
- For MTE: The operators made some nice progress to further decrease the vertical emittance.

ISOLDE (Erwin Sieling):

A very good and exiting week for ISOLDE:

HRS has been in standby with a broken target (vacuum leak) which will be replace this week by a ZrO target.

The GPS has been fully dedicated for the HIE ISOLDE beam commissioning and first radioactive beam to the Miniball experiment.

During the week the proton scan was done and the RILIS lasers scheme set up for Zink and injection of stable beam into REX Trap and to EBIS was performed: Stable ^{64}Zn Wednesday/Thursday-morning from GPS through the REX Trap to EBIS.

At the HIE ISOLDE Linac stable beams were accelerated from the EBIS to the Miniball setup (pilot beam ^{12}C 4+ and ^{22}Ne 7+ Monday/Wednesday).

After scaling the Linac on Thursday-afternoon the first radioactive beam ^{74}Zn 25+ was sent all the way from GPS to REX Trap, the EBIS, through the REX warm Linac and accelerated through the HIE ISOLDE Cryo Module to the Miniball experiment with an energy of about $\sim 4\text{MeV/u}$.

Very happy users and an equally happy operation team. Many congratulations from inside CERN and from the international ISOLDE community followed.

Issues:

Due to heating of the couplers in the super-conducting cavities we cannot run above an accelerating field of 3MV/m (about half of the nominal field). It also limits the running time of the cavities to 6-7 hours and only during working hours and the availability of the RF specialists. Therefore we will now daily run the HIE Linac from the morning after a restart/set-up of the RILIS lasers until into the afternoon. Due to a broken Si detector at the end of the Linac we could not measure the exact energy of the beam. The Si detector has been replaced Friday-afternoon to profit from the weekend for pumping down the sector again.

PS (Guido Sterbini)

It was an average week for the PS.

The operational beams were delivered to the users and the preparation for the new beams continued. A version of the LHC25ns with 36 bunches starting from the nominal 72 bunches was prepared during the weekend. The preparation of the new beams requested by HiRadMat started: the 12 bunches at 25 ns and with $2e10$ ppb at extraction is ready to be delivered to the SPS.

On Monday a scheduled stop for the Linac2 produced 1h30 min downtime.

On Tuesday afternoon a faulty contact in the generation of the RF signal for the 40 and 80 MHz perturbed the LHC beams (longer bunches at extraction and difficulties in the SPS injection).

Wednesday was mainly devoted to the Ions MD. A new extraction compatible with the MTE shadowing was successfully tested. In the evening a problem with the ZT8.NHZ01 produced a 2h15 of downtime for the East South beams.

On Thursday there were minor perturbations of the operation due to problems with a 200 MHz cavity (C202) and a 10 MHz cavity (C86).

On Friday the 80 MHz cavity (C80-08) started to misbehave on the ions cycle. The problem was solved by the LLRF piquet by optimizing the extraction synchronisation with an adjustment of the radial position.

On Saturday night malfunctioning of the TOF transformer (BCT468) caused 1h50 of downtime for TOF. The BI specialist intervened and fixed it. On the other hand the AD beam was perturbed by a problem with a quadrupole (DEO.QN20_AT1, 50 min downtime).

On Sunday there were 3h40 of downtime due to a problem with an Linac2 RF interlock. In addition, due to a fault with a power supply on the TOF line (FTN.CHZ409S) there were 2 h of downtime for TOF beam.

During the weekend, the MTE reproducibility degraded. There were several shots with 90% transmission efficiency (between SPS injection and SPS extraction) instead of the expected 95-96%. Investigations are ongoing.

Along the week there were several episodes of wrong cycling in the TT2 quadrupoles (specifically F16.QDO225S). Sometime they do not pulse at the programmed value (they use the value of the proceeding cycle). If a high intensity beam (like LHC 25 ns 72 bunches) is lost, the TT2 chain trips. The specialist of the equipment is informed and the follow-up will continue. .

AD (Bruno Dupuy):

The AD had a normal week with very little down time.

Start	End	System	Comment
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Tu 20/10 14H58	15H30	DR.QUAD	Local reset by FirstLine
We 21/10 13H29	14H42	DEM.QN40	swop G64 +5V power-supply by FirstLine
We 21/10 14H58	15H18	DEM.DHZ10	Bad acquisition fixed by FirstLine
We 21/10 16H29	.	<i>Flux.Capacit or</i>	Great Scott!
Sa 24/10 04H10	-	DR.QUAD	Reset by CPS crew
Su 25/10 00H39	01H41	DE0.QN20	G64 power supply fixed by FirstLine
Mo 26/10 06H52	-	DR.QUAD	Reset by CPS crew

The rest of the week passed without incident.

The overall efficiency is stable, we extract, in good times and bad, about $3.1E7$ pbar to the experiments.

SPS (Django Manglunki):

A good week for the SPS. LHC 100ns was finished during the previous week-end so fixed target physics could take place during LHC fillings. The 8b+4e beam was successfully sent to the LHC, and the special 4x36b/25ns is ready for it.

On Monday started a long campaign of optimization of the electrostatic septum in order to reduce the losses in TT20. In the afternoon there were 2h of beam down time between 14:00 and 16:00 for an access in Linac2.

On Tuesday morning MKP tripped several times, two hours of beam down time were necessary to recondition it between 11:30 and 13:30. Preparation of the 8b+4e beam started.

On Wednesday took place the first dedicated Pb MD, and in the afternoon the 8b+4e beam was set up in the SPS; the LHC started to take it in the evening.

On Thursday morning one hour of beam down time was due to a mains trip caused by a cooling problem in BA5. In the evening another hour was lost on an MKD problem. During the night a BPM fault (BPH.61608 in LSS6) prevented filling the LHC, until the reference was changed.

On Friday, during the optimization of the electrostatic septum position, the anode of ZS2 was blocked. Unblocking will have to wait until YETS.

On Sunday the LHC asked for a beam with 4 batches of 36 bunches with 25ns spacing. It has been prepared on the LHC4 user which has 4 injections. In the afternoon there were four hours of beam down time due to an RF interlock problem in the Linac2, unfortunately followed almost immediately by one hour of beam down time due to MKP. Finally 40' of beam down time were caused around 22:00 for an MSI problem. All this was in the shadow of the LHC problems or when it was filled so only the North Area users were affected.

On the ions front, the single bunch beam for the fixed target run has been injected, accelerated, debunched, recaptured and accelerated to top momentum ($30 \text{ AGeV}/c$, or $76.1 \text{ ZGeV}/c$) on the 24 second long cycle during the dedicated MD on Wednesday. The short debunching still needs to be prepared before the cycle is ready for transverse settings optimization and extraction setting up. The single bunch LHC Pb pilot is ready too.

The double bunch beam for LHC filling has only been injected on the 48 second

cycle; its setting up is foreseen for the next SPS dedicated MD, on Wednesday 28/10.

LHC (From 8:30 meeting):

Last week there were 3 physics fills this week of which one was dumped by OP.

The beams used were the standard 25 ns with 1825 bunches and a test with 2041 bunches, which suffered from significant transverse emittance blowup on beam 2.

There were also two fills with the 8b4e. Although the second fill was dumped soon after reaching the 6.5 TeV flat top it showed a clear signature of less to no cloud.

By now the Integrated luminosity for ATLAS is 2.93 fb^{-1} and CMS 2.75 fb^{-1} .

The weekend was dominated by LDBS and cryo problems with an issue on the ADT in the shadow. Sunday night where were BLM related issues.

The next step is to try a fill with 2041 bunches, using the standard 25 ns beam and then a test with 2041 bunches with trains of 36 bunches.

Later this week a BCM test with 600 bunches is foreseen.

In the shadow of the CMS cryo regeneration also some items on the bucketlist will be addressed.

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