

## Accelerator Complex Status

### End week 38 (Monday 26 September 2016)

#### TI (Ronan Ledru)

- Monday: Emergency Stop in ME59 (building 112). During dismantling, an AUG cable has been cut by error
- Tuesday: Stop of LHCb Magnet due to a trip of the circuit breaker ERD202/8R. The setting up of the circuit breaker has been modified, a long term modification is planned
- Thursday: Helium release in the tunnel at LHC6. The reason is an error in the process control - the logic will be reviewed

#### LINAC2 (Giulia Bellodi):

it was a quiet week for Linac2, with only a 40 minutes beam stop on Friday morning to retune a cavity.

The source arc current was raised to achieve slightly higher intensity at injection in the PSB (~135mA).

#### LINAC3 (Giulia Bellodi):

At Linac3 we've spent a week testing the TWTA amplifier installed on Monday (for beam production with frequency mixing at the source). Beam intensity at injection in LEIR was increased from 33-34 uA to 35-36 uA for TWTA at 14.1 GHz and 300 W pulsed. Now waiting for feedback about LEIR performance with this beam.

#### LEIR (Steen Jensen):

##### Issues

- Tuesday, September 20th 2016
  - n/a (LN3 TWTA tests)
- Wednesday
  - n/a (LN3 TWTA tests)
- Thursday
  - 11h00 - Beam back (LN3 TWTA active => ~36µA, looking very good and stable)
  - 15h04 - "Samplers" application (XMotif) takes 100% CPU => being investigated
- Friday
  - 08h30, 1.5h - LN3 TWTA tests
  - 10h10, 5m - ETL.BHN10 in fault => reset => OK
- Saturday
  - Nothing to report
- Sunday
  - 08h00 - ER.CRF41 in un-resettable fault => RF specialist Monday morning

##### Activities

- Thursday: Inspection of ER.BTV12 => needs replacement during EYETS
- Friday: LN3 TWTA tests, beam to SPS for RF optimization, LEIR LLRF studies
- Beam to PS for lifetime studies (EARLY)

#### PSB (Bettina Mikulec):

Busy week with some good progress. PSB running quite OK, but still a few issues.

- On Tuesday evening, **BT4.SMV10** tripped. The ABT specialist had to access the machine to reduce the threshold for the water flow (R4 not available for 3h50m, all beams stopped during 1h55m).
- **Wire scanner** issues of replaced R2H:
  - Electronics card for rings 1+2 exchanged with the one from rings 3+4; since then the spikes observed in the profile of R2H are gone.
  - BI understood why the new calibration for R2H was wrong; they exchanged the calibration curve with the old one from 2014. R2H gives now again reasonable emittance values.
- On Wednesday the **high-brightness LHCINDIV beam for the LHC MD** was set up (2E11 p on ring 3 with transv. emittances <1 mm mrad).
- During Thursday's night shift, the RF specialist had to come in to exchange a fuse for **BR3.C16** (1h13m of perturbations for certain beams).
- On Saturday 53m downtime due to missing ERD of the rack for BI.QN010 and BI1.QN050/60.
- Throughout the week **a few controls issues** (notification failures, SIS didn't receive number of turns, AQN not following CCV, wrong status in working sets, subscription error); OP issues sent for follow-up by CO.
- Final **orbit correction campaign** started, now that all 6 correctors/ring/plane are available, with the aim to provide a good orbit correction for all beams before the end of the run (consequently, steering of the extraction lines might need adaptation).
- **Measurement campaign for wire scanner and SEM grid emittance comparison** by GP. Di Giovanni and G. Guidoboni; also in other machines ongoing measurements with the aim to better understand the measured emittance discrepancies between machines.

For Linac2: Friday morning 9:05 all beams were cut to allow cavity tuning.

### ISOLDE (Miguel Lozano Benito):

As you probably know last Saturday 17/09/2017 the 9GAP RF amplifier broke down. The amplifier manufacturer was contacted, as it is under guarantee, and they came on Tuesday night.

In the meantime, the RF experts started working in the old amplifier that we used last year in case the fault could not be repaired.

Bertronics experts quickly found and fixed the problem that was due to an isolation fault.

By Thursday afternoon the repaired RF amplifier was connected back to the 9GAP cavity after being all Wednesday night running at full power on the dummy load.

The HIE-ISOLDE tunnel was patrolled and RF enabled. Unfortunately, the 7GAP1 and 7GAP2 cavities tuners started misbehaving due to a mechanical problem. An intervention to fix this problem was planned for Friday morning.

On Friday the 7GAPs problems were solved in the morning and all RF amplifiers powered up after lunch.

Then we realized that the RFQ cavity controls were not working. The amplitude could not be controlled from the consoles. We contacted control's experts and it seems that there is a problem with the PLC that controls the RFQ RF amplifier.

We tried to run controlling manually the RFQ RF but after a while the RF regulation loop failed and the PLC crashed. At 20:30 and with no support available we decided to wait until Monday.

On Saturday I passed by and all the RF amplifiers PLCs were stopped and in error. All amplifiers were then switched off.

During the week on GPS we had some collections on GLM and time for beam tuning into the new VITO line.

HRS stayed on stand by for the HIE-ISOLDE run and provided beam for the REX low energy part setup.

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

Very few issues in PS this week. All beams have been delivered as requested. (LHC and SPS) MD beams (LHC25#56b\_8b4e LHC25#80b and LHCINDIV high brightness) scheduled for next week have been played and adjusted.

Systematic ion lifetime measurements show times between 3.5 and 4s.

On Monday there were three trips of POPS causing a total of 1h down time. POPS has not tripped since. Also on Monday the CPU of the front end in charge of the b-train generation went in fault causing two hours of down time.

On Tuesday 5 beam stoppers of AD and nTOF went in beam due to a PLC problem. One of the stoppers is not used and it is not part of PS control system anymore reason why it was not taken out initially creating radiation alarms in AD.

On Wednesday, work on the access system of T11 tripped SMH57 thus producing some disturbances on the EAST beam. Also, the programming of a cycle without destination in the sequence provoked several trips of KFA71, thus an instable delivery of the beams extracted to TT2. Other minor issues, the MTE beam was affected during two hours by a high voltage interlock in KFA4 and the ion beams 15m by a tuning issue in cavity C80-08.

First line had to intervene on ZT9.BVT01 on Saturday since the pulsing was found to be pretty instable and was affecting the experiments in the area.

The PIKick was called on Saturday during the night for only one module, our apologies for the inconvenience.

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

The AD has run without a hitch this week (unlike the last few weeks!!!) after the problems encountered last weekend were all solved.

So no down time at all at the AD for this week.

### **SPS (Verena Kain):**

Very busy week for the SPS, but also quite successful. At the beginning of the week the HiRadMat experiment Cablestack was successfully conducted. Screens were used at the target station to monitor the beam size from 4 to 24 bunches. They indicated a 50 % larger beam size than expected from optics and emittance in the SPS. Another optics than foreseen was hence used for the experiment. The discrepancy needs to be followed up.

AWAKE is in beam commissioning since Monday. The commissioning is progressing smoothly since it was understood that the angle provided by the main bends in TT41 was slightly wrong. The transfer function should be verified. The nominal intensity of  $3e+11$  has already been extracted. Optics and aperture checks have been carried out and the laser alignment with beam has started. The 800 MHz still needs setting up.

The nominal ion beam of 4 bunches was tested on the MD cycle and accelerated beyond transition. The longitudinal beam quality from the PS is fine. A lot of progress was made in the SPS, but further work is still required.

The LHC MD beam of  $2e+11$  with the expected emittance of 1  $\mu\text{m}$  has not been successfully tested yet in the SPS. The MD1 (Q20) cycle does not have any damper settings, and the horizontal emittance could not be preserved after injection. The preparation of this beam needs to be finished the coming week.

For most of the week the SPS provided indiv beams for the LHC, either low intensity and low emittance ones for the 2.5 km run or nominal ones for the re-qualification of low beta star on the weekend. BCMS beams were then also taken this weekend without

any difficulties.

Fixed target was happily running continuously. The intensities have not been further increased.

The availability this week was again more than 90 % with the majority of the faults (85 %) from the SPS injectors.

The UA9 SIS input is currently masked due to a controls issue which would interlock too frequently. This problem cost already about 1 h of down time. The expert is aware, a fix can however only be put in place on Monday. The UA9 equipment proper is also hardware interlocked. Only the collimators rely on software only.

The ventilator of a rack of the SEMs in TT20 broke down on Friday and will have to be repaired properly on Monday. A fix is in place for the weekend to be able to steer TT20. Gerd has provided a new very useful tool that provides the tunes at injection bunch-by-bunch for "each" beam from the injection oscillations. This was successfully used during the high intensity 25 ns MD on Wednesday.

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

Friday at 14:00 the last fill of the 2.5 km run was dumped closing a week of high beta forward physics. This was followed in the afternoon by the preparation of the low beta run at 40 cm and the half-crossing angle reduced from -185 microrad to -140 microrad in IP1 and IP5.

The first fills were to validate the machine, as usual after a technical stop, as this was not done prior to the 2.5 km run. Some issues were encountered and solved. It was also observed that the triplet in IR1 must have moved by ~50 micrometer with respect to prior to the technical stop.

Saturday night the machine returned to physics conditions with collisions and 2h30 stable beam with 4 bunches. This was followed with a fill of 169 bunches that remained in stable beam for 5h20. Vertical emittance blow-up was observed for beam 1. The fill with 600 bunches was in stable beams for 2h30, due to premature dump while moving the TCL.6R1, most likely UFO related.

The blow up in beam 1 was further investigated, using several fills, and the coupling was too high, which was partly corrected.

Early Monday the filling with 1177 bunches started.

There was excellent availability over the weekend, as only 9% was spend in fault. Many thanks to all the teams intervening during this busy weekend.

Plans:

- This fill with 1177 bunched and then back to 2220 bunches.
- Possible further correction of coupling at 45 cm and 50 cm after the fill of 1177 bunches.
- Multiple RF trips for which the piquet was called. This will be further investigated.
- Access needed for AFP, due to issues with the movement system.