

## Accelerator complex status

### End week 43 (Sunday 30<sup>th</sup> October 2016)

#### TI (Jesper Nielsen)

Summary for the last week:

<https://wikis.cern.ch/display/TIOP/2016/10/25/TI+summary+Week+43%2C+2016>

#### Linac2

Two issues for Linac2

- On Tuesday the gas flow of the source had to be increased after the observation of many missing pulses from the source.
- Saturday just after 6am the PSB operator had to call in the Linac2 SV and the RF specialist, as the RF of the RFQ and tank1 had tripped. The Linac2 team needed to exchange the crowbar ignitron trigger module; after this intervention the RFQ was not yet perfectly stable; to be followed up with the Linac2 team to see if this requires another intervention.

#### AD (Bruno Dupuy)

The AD had a good week with only two beams interrupts.

- Friday from 13H50 to 1H00: Loss of security condition on the beam line for AEGIS (Beam stopper was not in safe position and laser room unlocked during access).
- Saturday 10H00: Reset AD Stochastic Cooling Amplifiers.

The intensity of the beam is very good upper than  $3.3 \text{ E}7$  antiprotons by extraction.

#### LEIR (Maria Elena Angoletta)

A quiet week for LEIR.

Ions have been delivered to SPS for setting up from Wed 26 to Friday 28 October. NOMINAL and EARLY beams were provided, as well as a "low-intensity" version of NOMINAL with only one injection (less than  $2\text{E}10$  charges at extraction in LEIR) on Friday 28th.

On Wed 26 a pump was changed in Linac3, causing less than 2 hours downtime in LEIR. This did not affect neither the normal operation (as SPS had switched back to protons after the PSB short stop) nor MDs.

On Thursday there was an RF MD whereby the new LLRF was optimised for operation with the spare cavity CRF43. This means that the same intensity can now be extracted from LEIR also when switching to the spare cavity. Operationally we are going to complete the 2016 run with the cavity CRF41 but thanks to the new LLRF it will take just 3 clicks to move to the spare cavity, in case of need.

On Friday 28 October BI has attempted to upgrade to FESA3 the software for some BPMs on the LEIR extraction line. Unfortunately a roll back to PPC4 and FESA 2.10 version was needed since the SIS33 boards are not compatible with Linux owing to their current firmware version (which will have to be upgraded).

On Friday night the intensity from Linac3 degraded but the Linac3 supervisor quickly solved it by shaking a bit the oven (I guess this is just a layman view of the story, and it is not LITERALLY what he has done ... or so I hope! :-) ).

## ISOLDE (Eleftherios Fadakis)

### Short report

Target change on Wednesday late morning. Beam (9Li<sup>3+</sup> at 6.88MeV/u) delivered to users(experiment IS561) on Friday night.

Significant drop of counts on Saturday morning. After the intervention of Miguel, Alberto, Fred and myself we got a factor 6 increase in counts compared to Friday.

Main issues:

- REXTRAP REXEBIS timing synchronization problems on Friday.
- Amplifier for 7GAP1 has tripped several times through the run.
- The SRF cavities had many trips as well but they are faster to recover from.

## Booster (Bettina Mikulec)

The week could have been calmer, but was not too bad after all...

- On Tuesday the observed phase error between the C02 and C04 cavities on ring 3 could be traced back to an intervention on Monday, where a BNC connector was damaged.
- At 3pm another water leak appeared on the Finemet cavity (happened already the week before), kicking out the C16 cavity. The water had to be pumped out and the C16 cavity left drying during the night, during which time the PSB operated once more in degraded operation (affecting mainly high intensity beams and beams using longitudinal shaving; practically no effect for the LHC production beam); at this occasion M. Haase changed also the gap relay of ring 3 C16, as this had a negative effect last week on the high-intensity users when the cavity was switched off. After another access Wednesday morning to put back the C16 in operation, the situation returned to normal.
- We decided to stop the Finemet reliability run for this year after these two incidents (unless the RF team could make a proposal for a reliable modification of the Finemet water cooling circuit to be carried out on Wednesday).
- Thursday night the kicker frontend cfv-361-mkpsbinj had to be rebooted twice by the on-call ABT piquet; the CPU of this frontend needs to be exchanged on Wednesday.

At several occasions during the week losses at extraction were observed with the ISOLDE beams. Careful investigations of the operator showed that the origin was a shift in the synchronisation frequency by ~200 Hz. This happened already a few times throughout the year, but now logging of all the relevant parameters is in place, and hopefully the reason can thus be identified and solved or at least an error message issued on LASER to be able to react faster to this problem.

## PS (Matthew Fraser)

It was a very good week for the PS (> 90% average availability) with most of the downtime coming from the upstream machines.

- A recurrence of the FineMet cavity water leak in the PSB on Tuesday, which flooded cavity C16, caused almost 4 hours of downtime for the two interventions required to recover operation. Thanks to a repair of the C16 gap relay of R3 the impact on the intensity of the MTE and AD beams in the PS was minimal whilst the C16 was out of operation until Wednesday morning.
- The PFW.WFW power converter was swapped back following tests with FGC in the shadow of a short 15 minute intervention required on the recombination septum of R4 of the PSB. POPS needed help from the piquet to restart after the intervention.
- On Saturday morning the Linac2 RFQ was down for 3:20h
- On Sunday morning a HV interlock on KFA21 caused 2:20h of downtime for MTE before the piquet could solve the problem.

The nominal ion beam continued to be delivered to SPS and the low intensity ( $2.1E10$  p/b) LHC100 18b proton beam for the upcoming p-Pb run was successfully sent to and accelerated in the SPS. For this beam the RF specialists are investigating moving the triple splitting back to 1.4 GeV to help improve the splitting efficiency. LHC25 12b BCMS was provided along with LHC25 80b for MDs.

## SPS (Francesco Maria Velotti)

The SPS week was characterised by the LHC MD. Some MDs required constant extractions, hence there was an LHC cycle (mainly PILOT or INDIV) for quite some time in our SC.

Also, the discussion about the possibility to replace the QF.120, which was identified as very likely responsible for the QF glitches on the slow extraction, has started and converged in a plan for next week.

Lots of work done on the optimisation of the tune at FB for the ion cycle.

### Monday:

- **HiRadMat MD continuation from Sunday**
  - The optics of the TT60/66 is under investigation to understand the discrepancy found between screen measurements and expected from model
  - The BTV in TT60 were using an internal time reference - Enrico rebooted the FESA class and setting it to "external"
  - The camera of the TT60.BTV.610317 is not functioning properly - very weak signal and quite noisy. Enrico and Stephane Burger have been informed.
  - The application to control the BTV at the end of TT66 is BISTEP
    - Enrico asked to put the reference values of the positions at which the screen can move in equipment state like done for the BTVE
- North Area:
  - Cooling problem. Magnet expert working in the area opened the cooling and a leak developed
- There was change at the PSB due to switch of ring (4 -> 3) which translated in the need to change the bucket at injection on the INDIV cycle

- The change of the injection bucket done at around 17:00 on some cycles was due to the change at the SPS RF pickup. Now all it is back to normal
- **12 bunches BCMS taken** and ready for LHC MD. Accelerated without problems. Intensity of  $\sim 1e11$  p/bunch.
- There was a **new SIS release to add monitoring of the north extraction timings** (check that no more than one cycle playing send the timing event to the NA). This stops the beam to alert the operators, although this might be changed in the future

## Tuesday:

- Settings for all ion cycles adjusted to match the LHC one. To be checked when these beams will be sent to the LHC for steering
- Injection oscillations on the first 2 bunches injected and last circulating increased. The intensity difference among bunches closes to the batch spacing observed in the LHC is also visible on our FBCT.
  - Damper settings rechecked for LHC4. The damper pick up is saturated for the second batch but not for the first
- Beam stopped for 30 minutes due to an intervention in the booster (recombination septum of ring 4) and in the PS (PFW).
- Wednesday the 2nd November, a main intervention on the main network will take place. With the available news at the moment, access in the injectors should be possible.
- **Vacuum team would like to have an access to check the QDA219.** The pressure has improved of about an order of magnitude from the UA9 night
- **New NA sharing: 40 for T2 25 for T4 and rest for T6**
- LHC requested a higher intensity fill for B1. Tested and ready 2 BCMS batches with  $1.18e11$  p/bunch in 1.6 mm.mrad. They requested also  $1.3e11$  p/bunch but this might be too high for the TIDVG - not tested.
- Booster went in access to check status of the water leak ( $\sim 1$  hour)
  - Ion cycle 7 injections taken to continue commissioning
  - Access given to the RF power guys to exchange a tube for TX5 to profit of this downtime
  - water leak detected in the booster - access requested for Wednesday at 8:30 for 1 hour to try to put it back in place
- The LHC 8b4e was taken for a while with 1 injection and the ZS2 tripped do to the high sparking rate
  - Restarted and it was back straight away
- Relative quite night - for few hours beam unstable from LINAC

## Wednesday:

- LHC dumped the beam just before 8:00, hence access in the booster was slightly delayed
- 1 hour access in PSB - ion taken for operational cycle optimisation
- BIC server of extraction interlock down - LHC fill interrupted
- The inversion of the RF pick up done has not solved the problem completely - still observed a sudden change of the radial position on the SFTPRO cycle
- A modification of the low level RF was done which is not PPM and it is not compatible with LHCION1 and 2
  - the roll back will take 5 minutes and should be done before taking ions
- LHC MD started with no problems - HB INDIV delivered with requested parameters

### Thursday:

- BSRT calibration MD in the LHC should have been done without perturbing FT physics with HB INDIV with nominal intensity, but they didn't manage to blow up the beam as wanted using the ADT. Screens on TT10 were finally used, as last time. It worked but costed about 30 minutes of FT physics
- When we had the ion cycle (MD4) in the SC, a change in the revolution frequency caused the latch of the dump kickers, stopping the beam
- **100 ns beam taken on the LHC2 cycle. Intensity  $2.2e10$  p/bunch. Accelerated at flat top**
- Quite night, except for the TX7 tripped 3 times - restarted and kept working. Expert not called.

### Friday:

- **The TX7 tripped again, restarted. Piquet called anyway to investigate. Card replaced in TX7.**
- PSB extraction kicker problem. There was the request to have an access but then, talking to the experts, they decided to wait until Wednesday
- AWAKE cycle put in the super cycle for few hours. They needed to synchronise some instrumentation (mainly BTVs)
- AWAKE patrolled before their beam time
- Etienne checked the synchronisation of the MKP switches - nothing strange found. He proposed to redo the fine synchronisation with beam as the voltage rebalancing might have changed the weight of the different contributions
- During the night, there was a problem to an RFQ of the LINAC but beam back after not too long

### Saturday and Sunday:

- Quite weekend, except for saturday night were **multiple glitches on the QFs caused some complains from COMPAS and NA62. This was when the LHC INDIV cycle was in the SC. Then we went back to two FT cycles and all was fixed.**
- All BLM crates lost at the same time and also BCTs - ~1 hour with no beam