

Accelerator Complex Status

End week 47 (Monday 26 November 2018)

TI (Ronan Ledru)

Rather calm week.

Fri 23/11/18 at 21:15, Flooding from the roof of the building 169. The Fire brigade went on site to collect the water. The RP and Vacuum piquet were contacted as the leak impacted their equipment.

Details: <https://wikis.cern.ch/display/TIOP/2018/11/23/TI+week+summary%2C+week+47>

CLEAR (Kyrre Ness Sjobaek):

In week 47 the main activities at CLEAR were as follows:

Monday 19/11 -- access

- Repairs to laser system
- Measurement of CLIC module position by alignment team and testing of the mover. Apparently when the module is aligned with the beam, it is not centered in its "crib" and the girder is strongly crabbed.
- Installation work for new plasma lens Marx bank

Tuesday 20/11

- Installed new double Marx bank at plasma lens experiment, first tests up to 600 A, debugged installation (bad current probe)

Wednesday 21/11

- First gradient- and fine timing scans at 600A in Argon
- Marx bank broke a capacitor, need access to repair

Thursday 22/11

- THz in the morning, doing BPM scans and bunch length measurement scans
- Short access around lunchtime to repair Marx bank
- Realized that the PLE movers are not affected by the Marx bank firing, this removes the need for cycling the marx bank on/off when moving the lens
- Another short access around 18h00 to repair again
- More tests with beam at 600A

Friday 23/11

- Setup a very nice beam, 60x60 um spot size at the PLE and well aligned beam.
- Recorded very good data with Ar at 600 A at several different timings
- Tested Helium injection, found that we should probably try to lower the buffer volume pressure in order to avoid excessive ground currents via the walls
- Access from 17h30, installed 3rd Marx bank in parallel to the already-installed double Marx, in order to go to ca. 850 A and tested in Ar. Got it running very well.

LINAC3 (Jean-Baptiste Lallement):

The source ovens were refilled with new lead on Monday morning and beam was available to LEIR early afternoon.

The tank3 went down during the night from Monday to Tuesday. The RF expert came in and fixed several issues on tank2 and tank3 (IGBTs on tank 2 & 3 and cathode switch control box on tank3). Because of a glitch in the meantime, the PLC

controlling the tank3 tuners had to be reset (beam back on Tuesday morning - total ~ 7 hours downtime) .

The week went pretty smoothly with usual and frequent source tuning, until Saturday evening when the beam current out of the source became slightly unstable. The stability of the source degraded suddenly on Sunday at 13.00. It took few hours and the intervention of the source expert to recover a stable situation.

Unfortunately, the RFQ went down in the meantime (at 17.00). The RF expert had to come in and, after investigations, found a faulty ignitron power supply that was replaced. Beam was back to LEIR at 23.20 (~ 6 hours downtime). After few further ion source adjustments, stable operation was recovered.

LINAC4 (Bettina Mikulec):

After several issues during w46, we could start Monday last week evaluating the beam quality, following the linac re-phasing after the exchange of the cavity loop controls cards.

There were issues with transmission around the bending magnet, large position/intensity/phase fluctuations and wide beam profiles.

Therefore on Tuesday longitudinal measurements were performed with the bunch shape measurement system that showed that the beam was exiting the linac debunched.

After several checks on Wednesday it was decided to re-phase all cavities once more, which was started on Thursday and finished Friday evening.

Beam measurements Friday evening after re-steering showed excellent results, and finally we could set up a long 'commissioning' supercycle with cycles imitating the first post-LS2 PSB commissioning cycles, sent both to the Linac4 dump and the temporary dump.

Unfortunately beam operation had to stop in the night from Saturday to Sunday due to a fault on the CCDTL3/4 modulator, which is being followed up right now.

A few faults during the week, but nothing very long-lasting.

LEIR (Nicolo Biancacci):

Overall good production week for LEIR.

On Tuesday the MDRF cycle was finely tuned to reach the record intensity (on this particular $h = 3+6$ cycle) of $10e10$ charges extracted. The beam was since then used on request of LHC with no particular issues. The extraction to PS was further optimised to reach 100% transmission efficiency.

On Wednesday tests with lower intensity from the SPS were performed using the Linac3 slits: parallel MDs (space charge and electron cooling) took place when compatible with the tight super-cycle availability.

On Thursday we had smooth production, interrupted by a short beam interlock issue related to the access condition for the PS switchyard. On Friday, on parallel to small optimization on the operational cycles, MDs on electron cooling and ramping/debunching zero crossing took place.

Between Friday and Saturday, EPC was called for a non-resettable HT sum fault on CRF41, promptly fixed.

On Saturday afternoon, a lower intensity was delivered by Linac3 which implied a small retuning of LEIR. Nevertheless, the source was back to standard operation (>30uA) for the LHC filling period.

Since Sunday afternoon, the source exhibited unstable behaviour and it has been retuned by the Linac3 experts on the shadow of the LHC stable beams.

Unfortunately efforts did not pay enough as a parallel problem on the Linac3 RFQ took place and experts are investigating. Hopefully the issue could be solved in the shadow of ALICE access.

ISOLDE (Simon Mataguez):

It has been really a good week at ISOLDE.

Wednesday at noon, we stopped to deliver 7Be to XT03.(IS554) from GPS.

We switched the central beam line, and have delivered 138Ba 19F / 226Ra 19F for CRIS at 40kV from target #637 UC+CF4 on HRS which was pre-irradiated at Isolde some weeks ago.

On the HRS, the HT showed some fluctuations and trips few times. Jan Schipper and Thierry Gharsa plan to make an in-depth refurbishment during LS2.

PS (Frank Tecker):

The PS had a good week, with beam availability of about 88%. The ion beams were sent to the EAST area with various intensities and beam sizes on request. A 3-bunch beam was properly set up with an intensity of around $8-9 \times 10^{10}$ and used by the LHC.

The main cause of downtime came from the ion injectors. Problems on the PS side were only a trip of the switchyard due to the access system manipulations for the new PSB POPSB, which caused 1:15 downtime, and a trip of septum SMH57, causing 0:40 downtime.

Since Tuesday, the 10 MHz cavity C76 is down and needs tunnel access for the repair. Since we verified that we can run the ion beams with even only nine cavities, we can absorb the trip of another cavity without implications. Consequently, it was decided to postpone the repair until a good occasion for the access.

SPS (Hannes Bartosik)

It was a good week for the SPS. After the oven refill on Monday the beam came back in the afternoon with very good intensity and stability for most of the week. The North Area fixed target beam could thus be delivered with very good reproducibility. However, due to longer stops caused by issues in LEIR (extraction kicker) and Linac3 (RF) on Monday night and Sunday afternoon/night the overall beam availability was only 81%.

On Tuesday the long LHC filling cycle with 12 injections was prepared for the injections of 3 bunches spaced by 75 ns from the PS and sent to the LHC for the first time. A significant increase in intensity was achieved compared to the previously used 4 bunches space scheme. During the dedicated MD on Wednesday an even longer cycle with 14 injections was prepared on the request of the LHC, which allows reaching 733 bunches in the LHC and record peak luminosities for Pb-Pb collisions.

Some intermittent issues with the synchronisation between SPS and LHC were encountered on Saturday but the source of the problem could not be found. Otherwise the LHC fillings went very smooth until the Linac3 RF problem occurred on Sunday afternoon.

The preparation of the cycle for partially stripped ions to be sent to AWAKE for calibration purposes is well advanced. However, during an attempt of extracting the beam to the TT40 TED it was realised that the dynamic destination from LEIR to AWAKE is missing. This requires an update of the timing system, to be implemented next week before AWAKE can take the beam.

LHC (Elias Metral & Jorg Wenninger)

The week started on Monday with the source refill that was efficient and good beam intensities were back in the evening. In a long fill in the shadow of the source refill, an IT skew quadrupole trim was found to restore the luminosity in ALICE to the expected levels.

In the night of Tuesday to Wednesday the first 450b 75ns spacing fill was used successfully as last fill with positive ALICE polarity.

Wednesday was dedicated to the setup for negative ALICE polarity which includes a flip of the external crossing angle just before colliding the beam. At the same time the IT skew quadrupole knob that fixed the ALICE luminosity was also implemented (main impact is on orbit due to feed-down from the bumps).

After the loss of a first fill at flat top due to slowish losses in IR7, the thresholds of some TCSGs in IR7 were raised by a factor ≥ 2 (depending on RS) and the beam was scrapped in the horizontal plane in the SPS. This cured losses and injection and during the LHC cycle. Between Friday and Sunday the record (levelled) luminosities were pushed to $6E27 \text{ cm}^{-1}\text{s}^{-1}$ in ATLAS and CMS with 733b per beam (75 ns spacing).