

Accelerator Complex Status

End week 40 (Monday 8 October 2018)

TI (Ronan Ledru):

Wed 03/10/18 at 08:23, Stop of the fine water circuit FDED-0021 at BA82 due to a leak detection Users were doing an intervention without warning anyone.

Wed 03/10/18 at 11:38, Trip of the 18kV circuit breaker EMD208/E18 due to a spike on a temperature sensor. SM18 Cryo was stopped.

Details: <https://wikis.cern.ch/display/TIOP/2018/10/08/TI+Summary%2C+Week+40>

CLEAR (Roberto Corsini):

Quite a busy week in CLEAR. The available beam time was dedicated to: 1) beam studies to optimize RF phase, laser beam spot size and solenoid setting; 2) measurements of Wake-field kicks from the CLIC prototype structure and related studies of the wake-field monitors response; 3) tests of THz radiation production; and 4) preliminary beam set-up of the Plasma Lens experiment.

A main concern with hardware is the continuing issue with the modulator-klystron MKS11, suffering several trips over the week (especially on Thursday). In spite of that, we could operate above 200 MeV and the beam activities in general were successful, gathering useful data. A new modified laser pulse picker was also installed on Thursday, and showed excellent performance. Rise and fall time looks short enough to grant real single-bunch operation.

LINAC2 (Rolf Wegner):

Linac2 is running quite well. 2 issues occurred during last week: 1) Tank 2 tripped on Tuesday night and caused 12 minutes downtime. 2) On Sunday evening vacuum pump VRPIT.363.R39.33 (on Tank 1) broke. The interlock had to be moved to another pump, causing about 1 hour downtime in total.

Otherwise, the ion pump LI.VPI4 on the RFQ had to be restarted last Monday.

LINAC3 (Rolf Wegener):

Linac3 was running quite well until Friday. On Friday morning the source RF tripped and could be reset. Over the weekend, the source RF tripped a few times, a faulty connection of the LLRF on tank3 was fixed and the source was tuned several times to stabilise the beam intensity.

Last Monday the leaking cooling circuit on the source waveguide was bypassed.

LINAC4 ():

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LEIR (Maria Elena Angoletta):

LEIR has operated mostly correctly during the week, sending NOMINAL and/or EARLY beams to PS on Wed to Friday (not all the time) and EARLY to SPS on Friday.

An excellent news is that, between Wed 3 and Thu 4 October, LEIR NOMINAL was at the LIU-required performance for 12 hours: 9E10 charges were extracted on average, for an accumulated intensity of about 10.5 E10 charges.

Several MDs were carried out, such as triple harmonic operation with two cavities and further cooling studies. In particular, for IBS measurements it was found that if the gun voltage at the end of the dragging is set to values that are too high, the horizontal emittance grows during the dragging. This growth starts before switching off the ecooler and will give misleading values of equilibrium emittances.

Problems were experienced with the control of the HLRF (Finemet cavities). The operational cavity for this run is the CRF41 but the CRF43 was switched on for MDs, too. Both cavities showed non-resettable faults with their power supplies and the EPC piquet had to be called at different times.

In particular, on Thursday afternoon the CRF41 cavity kept going down. This was due to the combination of several problems. It was traced back to an EARLY cycle where the ecooler had been left switched off because of reference measurements and for which the cavity protection against frequencies outside the normal operational range was not properly working. It seems that, although no beam was captured, the radial loop could see some sort of radial position and was dragging the frequency to the cavity outside its normal frequency range. On Friday morning the beam was restored and a protection was added to the LLRF, to limit the frequency coming from the radial loop to a maximum of 5 kHz. Until EARLY was restored to normal operation, PS/SPS were coupled to MDEARLY instead of EARLY.

Finally, Richard Scrivens asked to do measurements on the Linac3 LLRF sensitivity over the weekend. To enable him to do this, a sequence of two NOMINALs with good accumulated intensity was prepared and left in the supercycle for him.

PSB (Vincenzo Forte):

It was a good week for the PSB with 95.9% availability. The main fault was the unavailability of the ISOLDE SEMgrids for ~ 5 hours, which was solved by BI experts through a recompilation of the related FESA class. Such fault was blocking ISOLDE to perform the proton scan.

Other major fault was related to (1-hour) stop of Linac2 on Sunday, caused by a broken vacuum pump.

On Thursday Alan and Simon spotted a suspected issue with the closure of the R1 C16 gap relay, which was confirmed the day after by Matthias and will require 30-45 mins intervention in order to substitute the component.

PSB OP team was prompt to react to very last minute requests for HiradMat on Friday afternoon/night.

Very good progress for reference measurements (MD4544 family), which started this week (see summary [link](#) for details) and will continue in the incoming weeks.

Other MDs took place as usual (e.g. resonance corrections, brightness measurements and TFB scans).

ISOLDE (Simon Mataguez):

It has been a really good week at ISOLDE, target and machine behaved very well and users were really happy.

We have been delivering Sb (Antimony) to COLLAPS since Tuesday.

The only intervention by TE-ABT was on Tuesday to remove the interlock on the HT. The reason for the interlock was not identified. In parallel, both ISOLDE and MEDICIS targets have been irradiated.

PS (Heiko Damerou):

A good week for the PS with a beam availability of 95%.

A fault of the bumper BSW41 on Monday required an intervention by the power piquet. All fast extracted beams could not be delivered during 1h30, while the EAST beams were available again after 0h50.

On Tuesday the horizontal wire scanner in SS68 was blocked in an undefined position. The stop for the access took significantly longer than foreseen, due to an issue with the RP veto of the access system which could only be removed by the specialist after 1h15. The wire scanner was moved manually to a safe position, but the wire was found broken. The total downtime for the access accumulated to 3h15.

Following a number of short resettable trips during the previous week, POPS did not restart on Wednesday. The power piquet solved a problem with a ventilator which allowed to restart POPS after 1h30 without beam. Since this intervention POPS has been running smoothly.

A further ventilator fault in the power converter of ZT10.BVT01 repaired by the Firstline piquet caused stopped the beam to EAST_North for 1h.

Due to frequent trips of the 80 MHz cavity C80-88, the third 80 MHz (C80-08) had to be tuned for protons on Saturday to deliver LHC-type beams.

The bunch rotation of the TOF beam has been optimized. Following a test with nTOF on Wednesday, this seems to reduce the previously observed pre-pulses of the gamma-flash. The modified beam is delivered to nTOF since.

AD (Tommy Eriksson):

In the AD, vacuum is being re-established after replacement of the collector with the recently repaired spare unit.

We are hoping to see the first beams in AD tomorrow or Wednesday. Once e-cooling performance has been evaluated, we will have an idea of when physics and ELENA Pbar commissioning can be resumed.

ELENA (Christian Carli & Tommy Eriksson):

Not much progress in beam commissioning last week due to unavailability of both Pbars and 100 keV Ions. The ELENA Ion source is not yet operational. After various attempts to operate at 100keV, the new oil-insulated transformer sustained some damage and is currently removed and under investigation.

SPS (Verena Kain)

Week 40 was a very, very busy week in the SPS. On Monday afternoon HiRadMat 43 started and was successfully finished in the night from Monday to Tuesday with the last 288 bunch shot of the year to HiRadMat. On Tuesday the LHC had the preparation of the high beta run and in the evening low intensity MTE beam was successfully steered to the T6 target with the SHiP optics - with almost no beam instrumentation. The grids and split foils did not work. Only the new screens upstream and downstream of the test BDF target as well intensity on target could be used to steer.

On Wednesday the BDF target took beam during the dedicated MD. $9e15$ POT out of the $3e+16$ POT required in total could be accumulated. In parallel shadowing the ZS wires with a bent crystal was successfully tested. With the optimum alignment, beam channeled by the crystal can reduce the losses by $\sim 50\%$ in the extraction region. This beamlet has however a different trajectory in TT20 and is lost at well defined locations. More studies are necessary to see whether it is possible to steer TT20 such that the nominal as well as the channeled beam end up on the targets. On Thursday during the long parallel MD, Q22 high intensity beam was taken. It is more prone to instabilities than Q20 and was longitudinally unstable without controlled longitudinal blow-up towards the end of the ramp above $1.8e+11$ ppb in four 12 bunch batches.

Thursday evening HiRadMat 42 was started. It required about 2500 shots at various intensities (single bunches to 25 ns trains with $3e+10$ to $1.2e+11$ ppb), but always 2.5 μm emittance. The SPS injectors did a great job delivering all these beams. The experiment was running until late Thursday night and then through the night Friday, exploiting the LHC cryo down time.

Saturday morning at about 8h30am it was finished and with it the HiRadMat run 2018.

Until the weekend the SPS had a very good week in terms of faults. The main down time had been caused by the injectors until then. On Saturday however the 800 MHz cavity 1 caused down time of almost 3 h for the LHC due to a cabling issue that had been accidentally introduced in the morning after the HiRadMat run. (It had tripped towards the end of HiRadMat 42 leading to slightly longer bunches at extraction with 36 bunches). And all beams were stopped on Sunday for about 2 h and 40 minutes due to a broken GTO trigger module of the SPS dump kickers.

LHC (David Nibet & Elias Metral):

The first half of the week saw reasonable production despite short fills (no OP dump). A successful ~ 18 hour high beta test took place on Tuesday. Production was then interrupted on Friday by a cryo issue in point 8 (PLC issue, ~ 30 hours lost), followed by a problem with the SPS 800 MHz and an urgent access for CMS; in total ~ 38 hours without beam. Physics production eventually resumed in the night of Saturday to Sunday followed by mainly short fills. The week provided about 3 fb⁻¹ with an integrated luminosity for the year of 59.4 fb⁻¹.

A schedule update will be discussed and an updated schedule should be released later this week.