

## End Week 27 (July 5th) – Status of Accelerators

### Summary

<b>ISOLDE</b>	Back in business. A number of small issues.
<b>LINACS</b>	OK
<b>AD</b>	OK – some problems
<b>PSB</b>	Eventful week but some good delivery none-the –less.
<b>PS</b>	Smooth – extra beam to nTOF during SPS interventions
<b>SPS</b>	Mixed week. 24 hour UA9 MD. Intervention to change magnet, leaking extraction septum current lead found. Plus other niggling problems
<b>TI</b>	No major events this week. Power consumption on EHT4 still OK. Users (cryo mainly) contact TI before switching on big consumers.
<b>LHC</b>	See below

### Booster (Klaus Hanke)

The Booster had an eventful week.

On Monday there was a 1h stop due to an rf tube change in Linac2. Work was done on the wire scanners (comparative emittance measurements, still substantial discrepancies wrt the SEM grids in the measurement line). Work continued also on the single-batch transfer of LHC beams to the PS.

On Tuesday work was done on BTY.BHZ301 (sharing between ISOLDE front-ends), which occasionally puts itself in local mode. A magnet in the PS transfer line, which is normally never used and had been "consigned", was put back in operation for a PS MD. A timing problem caused the Linac watchdog to cut the TOF beams in the PSB; fixed.

On Wednesday setting up of staggered beam for ISOLDE was completed, and tests were done with the new ISOLDE interlocks and the staggered beam. From 15:00 - 17:00 scheduled stop (router upgrade). During the stop access was given to do a measurement on the broken septum, which is still in the Booster tunnel, and some maintenance work was done on the distributor, the MPS and BTY.BHZ301. In the evening problems started with the C02 cavities. After investigating first the ll rf, the problem was then traced down to the cavities themselves. The specialist came in and managed to re-start rings 1,3 and 4, but ring 2 remained off during the whole night. The TOF user was "moved" to ring 4, and staggered ISOLDE beam used rings 1, 3,4 instead of 2,3,4. The 4-ring users (EASTB) got slightly less intensity due to the missing ring, but all beams could be delivered.

Thursday early morning the recombination kickers tripped with a HV interlock. The specialist came in and could solve the problems, 2h down time. The cavity specialist continued to work on the C02 cavity of ring2, while all beams could be delivered using the other rings. At 15:00 access was given

and the problem could be definitively understood and fixed (gap divider changed). All beams were put back in their standard configuration.

Furthermore there were some issues with intensity fluctuations on EASTB and the steering of the LHC beam to the PS.

Friday beam was delivered for the SPS impedance MD.

ISOLDE was receiving beam on both front-ends in ppm mode, where one uses staggered beam and the other one high intensity beam.

Weekend quiet (so far).

## SPS (Django Manglunki)

Not a great week for the SPS.

On **Monday June 29th**, very little beam was seen by the users in between the many breakdowns and interventions (RF power TRX1 3 5& 6, kickers MKE4 & MKD, MPS, PS RF, Linac 2, wobbling station NR22, ...).

At 8:00 on **Tuesday 30th**, North Area and CNGS beams were turned off to prepare the coastable cycle for the UA9 crystal collimation experiment which took place quite successfully until Wednesday 7:00 . **That was the highlight of the week.**

On **Wednesday**, dipole magnet MBB621 was changed and several interventions took place in the shadow. During the transport of the magnet, five water leaks were spotted, 3 of which could be fixed rapidly. One water leak was found on dipole magnet MBA232, where the attempt to repair failed, meaning that magnet would have to be changed the next day; another one was found on the cable supplying MSE4183 (extraction septum for CNGS). The cable was purged in the afternoon and the repair was organised for the following day.

In the afternoon, IT updated the firmware of the routers.

The vacuum was good enough to open the valves around 22:00 but as there was a PSB problem at the same time (RF cavity on ring2), the SPS only tried to restart at 23:30. Unfortunately it was then impossible to open or acquire the status of the TED in TT20, for which there is no piquet service. The equipment specialists were unavailable. As the IT intervention on the routers was suspected as the culprit, A.Bland was called in. Eventually at 4:40 the OP team succeeded to open the TED locally in BA2 and masked the interlock, in order to supply some beam to the North area. Unfortunately the PSB was even more broken at that time (recombination kicker) and could only deliver one ring - 25% of the required intensity. Less than 40 minutes later, at 5:20, another interlock, this time from cooling one the first-turn stopper TBSM, prevented to give beam. The OP team found the rack where the equipment was but could not reset it as it was locked. As the intensity was low anyway it was decided to stop earlier for the next magnet change.

On **Thursday 2/7**, at the same time as the MBA232 dipole magnet change, work continued on the water-cooled cable for MSE4183, which was repaired by 15:30. Vacuum conditions allowed to open the valves at 23:30, but only the North Area beams could be delivered as the MKE4 would not fire

for CNGS. This was later traced to be a false interlock on the warm magnets (WIC). Several people got called in during the night (BT piquet, N. Voumard, N. De Metz-Noblat). The OP team found the PLC responsible for the interlock but could not reset it during the night as it required a password. The morning shift upon arrival called P. Dahlen who provided the password to restart the PLC.

*All those PLC problems (TED, TBSM cooling, WIC) were later traced to an intervention by CO on June 26th, an upgrade of the PLCs configuration, for which the specialist were notified on Friday lunch time. This modification only showed its effects when the PLCs needed to restart, probably after the IT intervention on the routers. It is not clear whether all the consequences are solved at the time of writing this.*

On **Friday afternoon** the mains tripped and caused a 3 hour problem on TRX1, eventually solved by the RF power piquet.

**On Saturday morning**, 4:40 were lost for North Area because of a wobbling station problem, which took the first line, X. Genillon and D. Calcoen to be called in. During that time, the OP team put the TT20-TED in and masked the software wobble interlock, in order to at least supply beam to CNGS.

Finally, since this **Sunday morning**, Diamon does not work any more.

*(CO - please do not to perform sneaky interventions without informing OP and the relevant specialists beforehand. Many hours of physics and sleep were lost ...)*

## Isolde(Erwin Siesling)

Double target change last Tuesday:

HRS a new UC target with W convertor.

GPS a refurbished SN liquid metal target.

This last one needs a 'gentle' proton beam STAGISO with 3 bunches 16us apart and max int 8E12ppp.

### GPS:

Stable beam setting-up was done on wednesday also by to the users.

Proton-scan and physics started Thursday.

Newly implemented interlocks (E. Piselli) on the proton-beam to protect the target running on STAGISO beam are working.

Collections at the GLM ongoing over the weekend. The users are satisfied.

Small vacuum issue at GLM: Pumping stopped today (Sunday) due to a small mistake by the users (manual valve control is not the best..). Got it to work again.

Monday a new target-change is foreseen.

### HRS:

Stable beam setting-up started on Wednesday.

Short circuit on the HRS extraction high voltage. A blown fuse was found in the de-humidifier cooler for the HRS target-zone faraday-cage (CEGELEC: Mr. Garcia). Moist or condensation on a vital spot must have made a conductive trace.

Stable beam setting-up only finished on Friday at noon due to several problems at the ISCOOL RFQ.

Proton-scan on target and convertor done Friday-afternoon and TISD (Target and IonSource Development) started.

TISD was supposed to run over the weekend but got stopped Saturday-afternoon by more problems at the RFQ:

### **ISCOOL RFQ:**

Several problems occurred during the last few days:

**Controls:**

Thursday RFQ elements controls were not working due to a server problem also the Helium pressure control did not work. This issue was solved on Friday-morning (CO Piquet and F. Locci). A configuration was missing on the ISCOOL PLC.

### **Vacuum:**

Saturday-afternoon the RFQ valves closed due to bad vacuum pressure at the RFQ injection triplet. All was checked but there was no way to decrease the pressure even with all valves closed. Today after more test it was sure it was the read-out. Dis- and re-connecting the gauge finally did the job (including restart of the vacuum system, etc).

(There is no vacuum-piquet for Isolde and specially the RFQ is somewhat an orphan with regard to vacuum controls. Therefore these sort of issues are handled by BE/OP).

### **REX:**

As of tomorrow, Monday, a physics run on HRS to the WITCH experiment using the REXTRAP is foreseen. We are dealing with some problems with regard to TRAP controls (missing communication from time to time). Hoping to solve this tomorrow-morning.

Beam to REXTRAP from HRS is available.

### **Other business:**

To reduce the number of runs of the scanners it was decided to reduce the running time from 15min to 10min and implement an auto-stop when closing the application. Mechanical improvements are also under study by BI.

## **AD (Pavel Belochitskii)**

### **Monday:**

No beam from PS for couple of times, then major problems with electron cooler: jump of the cathode voltage offset and no fluctuation of this voltage. We observed this in 2007 as well. Voltage stability was achieved by bypassing electronics chassis. New voltage offsets were established and new settings for optimal cooling were found.

During the day, then at night, intermittent interlocks on ejection kicker module 2. Reset works, during night done by CCC team.

**Tuesday:** ok.

**Wednesday:**

no beam from PS from the morning till 5 p.m. Reduced intensity due to problems in PSB.

Problems with CO2 cavity, solved by M.Haase. ASACUSA access system was blocked, solved by specialist. PSB.KFA down, very little beam during part of the night.

**Thursday:** cavity CO2 down, reset o.k. Magnetic horn down> reset o.k. beam losses caused by power drop in the vertical stochastic cooling system. Due to access to Booster some time no beam was available. Smaller intensity during part of the day due to one ring in Booster missing.

**Friday:** jittering of beam extraction time. Solved by change of phase offset, synchro loop gain increased a bit. Problems with low intensity beam for ASACUSA solved (probably) due to eliminating hysteresis related effect in the line.

**Saturday:** o.k.

**Sunday:** o.k., except of often faults of ejection kicker, solved by reset by CCC team.

## PS (Rende Steerenberg)

The PS has been running quite smoothly last week. There were only minor problems that got solved quickly and do not require a longer term follow up.

However, the point that needs follow up is the following: Since the SPS was not running some days last week, we tried to maximize the number of pulses to nTOF to recuperate some lost time and integrated intensity. Unfortunately were not able to send more than  $1.25E12$  protons per second, otherwise the radiation monitor PMITOF03 (cartridge in the water cooling station) gave an alarm. In the past, with the old target, this limit was above  $2.2E12$  protons per second, nearly a factor 2 higher. The reason for this is the radiation level outside the water cooling station, which becomes too high. There is now an agreement to increase the shielding.

## LHC

S34: Pressure test 4 July – OK. Helium leak in vac sec 19R3

S56: Vacuum leak located and repaired. (B32L6)

S67: all electrical connections done, last welds, last W this week, re-measure MB & MQ

S45: PIM intervention required. Having a look around in there - plastic shim pulled out – little bit left in. Little piece of MLI also seen.

Hit list shuffle. Open down to 60 micro-ohm (top 3), leaving significant number of high resistances behind. Cf. 30-35 micro-ohm repair threshold in other 4 sectors. Working on the principle that we did this to establish cold-warm correlation.

69.8 micro-ohm maximum seen. ( +/- 15 micro-ohm on segment). This splice shown – one of the worst seen.

DN200 – prep and DSR4 and 31R4 to 33R4 done. DFBA – installation this week.

This week: final segment measurements, finish splice repairs, start pumping Weds., finish endoscopy, no more DN200s, Close a little late – mid W29.

