

Accelerator complex status

End week 15 (Sunday 12th April 2015)

TI (Jesper Nielsen)

TI summary of the week:

<https://wikis/display/TIOP/2015/04/13/TI+summary+week+15%2C+2015>

Linac2 (Jean-Baptiste Lallement)

Very good week for the 2 Linacs. No problem to report.

The Linac2 H2 bottle was changed on Wed. morning. As foreseen, I took 2 hours (8:30 - 10:30).

LEIR (Michel Bodendorfer)

Here is the LEIR summary of the extended run, focused on the (only) dedicated MD time in 2015. The MD has been very fruitful and we have discovered essential attributes of the LEIR machine which need attention during the technical stop ahead and which will help us with the setup of the PB54 beam in this summer.

- An original method of measuring the chromaticity of the unbunched beam was developed, using a momentum slope on the flat bottom, driven by the electron cooler. This was not possible before because we lacked the dedicated MD time and the quicker electron cooling rate by the higher electron beam current. Both, the horizontal and the vertical chromaticity of LEIR, were measured to be negative.
- The transverse feedback stabilizes the high intensity Ar beam and helps achieving higher peak accumulated Ar beam intensities.
- The current of the electron beam in the LEIR electron cooler has been increased from 200mA to 335mA. This has resulted in a shorter cooling time. The reduction of cooling time by a higher electron beam current will be invaluable for the setup of the LIU-Ions beam upgrade of LEIR.
- Making use of a longer cycle length and the quicker electron cooling rate, we have found a similar intensity related ion beam loss at RF capture before the magnetic ramp as with Pb54 in 2012 and 2013. We have managed to accelerate Ar beam with insignificant loss only from one multi-turn injection. Any higher number of multi-turn injections have resulted in large beam loss at RF capture. Control problems with low level RF settings prevented us from fully implementing an H2+H4 RF capture. H1+H2 RF capture was setup but has not mitigated the problematic ion beam loss.
- It eventually turned out that the chromaticity parameters can no longer be driven into the hardware, effectively forcing the machine to operate at natural chromaticity.

The LEIR team is very grateful for the extra days of dedicated studies, which allowed significant progress in the understanding of the behaviour of the beam and of the machine.

Let us know in case we can expand any of the above points.

Special thanks go to the Linac3 team who has provided Ar ion beam for 5 more days than originally planned.

ISOLDE (Pascal Fernier)

This week both GPS and HRS are used for setting-up and separator courses

GPS

Beam optimization and separator course until Thursday, then target change with semgrid target and proton beam optimization by booster until Saturday: then proton beam stopped at $3e16$ because target change will be made by hand Monday morning.

Few cables unused on the GPS crate inside HT room, people from PO group suspect they can act as a kind of 'antenna' and create perturbations on the ramping card of the power-supplies, owners of this cables should at least ground it.

HRS

Separator course Thursday and Friday, rest of the time used to improve transmission thru the RFQ.

100% transmission thru RFQ at 30kV but decrease at 40kV and more; the decreasing happens in few minutes (see Sunday HRS logbook); strangely any change of the voltage on injection electrode or HT RFQ affects the beam shape before the RFQ --> beam reflected by RFQ -->problem under investigation.

HRS.FC300 mechanically broken in the separator zone, will be repair this week if BI group as spare part.

Booster (Elena Benedetto)

Good week for the PSB, work mainly on two beams:

- LHCProbe: Optimization of the longitudinal shaving process by the RF experts, now it is possible to vary the beam intensity by using only 1 knob: the Voltage of the C16 cavity. Investigations on the shot-to-shot intensity fluctuations on this user: not yet clear what the cause is. BTW, this beam is now available also on Ring2 and Ring4...in case we have probl with Ring3...

- ISOGPS to Iolde: GPS was ready since Thursday early afternoon, however we managed to send beam to the SEM grids only from 17:15 on, due to the fault of a card on the BIS (Beam Interlock System), that took time to be detected and then fixed (experts were busy on the LHC). Steering on the GPS SEMgrids was finished by Saturday night, with a total number of protons on the target of $3.47e16$, comparable with last year. Several reset of BTY.QFO108 were needed, to be followed up.

Other beams delivered:

- LHC beams, several flavors including Doublets and 25ns High Intensity for setting-up.

- SFTPRO and TOF, different intensities

PS (Gabriel Metral)

Faisceau TOF envoyé sur la cible de FTN dès que la zone nTof a été prête à le recevoir. Il est actuellement délivré avec une intensité de $750^{e}10$ par pulse.

Quelques soucis avec les Bumps d'injection et d'éjection. Diagnostique compliqué avec des signaux d'observation de qualité médiocre pour les 4 bumps de l'éjection 16 (un arrêt de 4 heures est demandé par les experts pour solutionner ce problème). Pour l'injection, le bump 43 fluctue de plus de 10% (observation faite ce WE) et le réglage du faisceau TOF doit être repris régulièrement.

Mercredi, les spécialistes du groupe EPC ont poursuivi leurs mesures sur les les PFWs. ils doivent nous proposer une stratégie pour minimiser le 5Khz présent sur le courant et qui empêche d'avoir une capture stable pour les ilots MTE.

En plus du faisceau LHC nominal, 2 autres faisceaux sont servis au SPS. Un LHC haute intensité utilisé pour le scrubbing SPS ($1.4^{e}13 \Rightarrow 2^{e}11$ par bunch à l'éjection) et le faisceau doublet avec $1.5^{e}13$ accéléré.

SPS (Django Manglunki)

An eventful week for the SPS

The pilot beam was regularly delivered throughout the week to the LHC.

On Monday orbit scans in 418 demonstrated an aperture restriction in COLDEX, explaining the blow up observed on beam extracted from LSS4 towards TT40. Hot point on a COLDEX bellow was measured in the evening during an RP survey.

On Tuesday morning, after the Easter week-end, a vacuum team accessed to assess the damage and the possibility of moving COLDEX to a position compatible with the extraction of the LHC beam in LSS4. It turned out one of the sliding tables and two stops were broken and the Y-chamber had to be moved by 26 mm. The intervention was planned for the next day.

During the night, for 3 hours, a low level RF problem occurred due to a fault in the 6V power supply of a front-end (cfv-ba3-allproton1).

On Wednesday morning the primary Ar ion run finished in the North Area. After condemning the TED in, the interlock key was turned back to "proton mode". The whole morning was then devoted to interventions: access by vacuum & survey teams to try and move COLDEX into a safe position, and repair by TE/EPC of SMD6 which had been out of order for several days.

COLDEX was eventually moved by 17mm only, and a new aperture scan confirmed it is now sufficient.

Overnight two MD1 cycles with high intensity LHC25 ns beam were kept running for scrubbing.

On Thursday morning started setting up of the SFTPRO beam.

On Friday morning since the LHC was on access, the SPS was stopped for several interventions in the tunnel and on the surface: check of COLDEX by RP, upgrade of TED FESA class, TE/EPC for final repair

of SMD14. Intervention on the septa pump in BA4 could not take place as it needs more than two hours and a long advance notice.

When the beam was back, spikes were observed on QF during SFTPRO, provoking kinks in the spill. Also some losses were observed on SFTPRO in 101. An access showed the aperture restriction was likely at the level of a vacuum valve.

On Friday evening up to 3 batches were injected on LHC25. This beam was stopped on Saturday morning to let the MKP cool down (from 42.5°C to 35°C on Sunday at 19:00)

During the quiet week-end only the pilot was circulating, in anticipation to the scrubbing run.

Many many thanks to Benoît for covering Easter Monday!