Summary of the 5th FOM Meeting

Held on Tuesday 25th Apr 2017

Agenda (https://indico.cern.ch/event/fom170425)

1. *Follow-up of the last FOM*
2. *Status of the machines*
3. *Summary and issues during PS HW commissioning*
4. *Report on AD+ELENA shutdown activities and HW commissioning status*
5. *Schedule updates*
6. *AOB*

B. Mikulec chaired the meeting.
The list of presence can be found in Annex 1.

1. Follow-up of the last FOM

The minutes of the last meeting were approved.

2. Status of the machines

Linac2&3

M. O'Neil reported the status of the Linac2&3 (Annex 2).
Very good availability of Linac2: only one stop due to RF tank 1 and quadrupoles that had to be reset. RFQ amplifier feedback loop had to be adjusted to reduce beam intensity oscillations seen on longer beams. Probably next week there will be an intervention on Tank 1 secondary pumping system.

Linac3 setup is ongoing and it is going well. About 30 mA of Xe beam out of Linac. Next week an ion cycle will probably be requested.

PSB

B. Mikulec presented the status of the PS Booster on behalf of **A. Findlay** (Annex 3).

From now availability plots from AFT should be used. There are still some issues with the new AFT version for the injectors that shall be solved soon.

PSB had 88% of availability.

RF works still ongoing on R4 because of the observed longitudinal instability. BLMs BT.BLM10 & BTM.BLM10 still faulty and specialist intervention required at next beam stop.

MTE low intensity beam was provided within the specs. TOF beam is within the specs as of the last night and also BCMS25 and LHC25 could be used by the PS.

ISOLDE

E. Fadakis reported on the ISOLDE status (Annex 4).
The last week activities were centred on Sem-grid target tests: on Wednesday in HRS and on Friday early morning in GPS. On Friday at 20:00 delivered stable beam (40Ar). On Monday afternoon delivered first protons to the users on HRS (35Ar). The beams were delivered to the users in time corresponding to the schedule.

REX-LINAC: expert working on commissioning the amplifiers (7&9Gap).

HIE-LINAC: expert performing hardware commissioning of the cryo-modules.

ISOLDE Users

Friday evening switch to GPS

PS

M. Fraser reported on the status of the PS (Annex 5).

Availability was 50%. Solving issue with PFW and Figure-of-8 (W8L) circuits (described in more detail below) took 75 hours.

It has been a steady start for the PS with a low intensity MTE beam delivered to the SPS on Friday afternoon and over the weekend at approximately 350E10 ppp. LHCINDIV is also ready for the SPS and setting-up of the AD beam has continued with an intensity of approximately 1000E10 ppp sent to D3. The AD Target beam permit was signed on Friday.

The closed orbit of the machine was successfully corrected by displacing Main Units (MUs) 18 and 33 on Wednesday morning, reducing the rms orbit excursion from 2.1 to 1.3 mm. The start-up has been complicated by on-going issues with the calibration and regulation of the FGCs in the power converters for the PFW and Figure-of-8 (W8L) circuits of the MUs. Aside from regular trips needing resetting or piquet interventions, confusion was caused as the machine was restarted after Wednesday's realignment campaign when incorrect settings were synchronised to the FGC on

PR.WDW. As a result, the tune of the machine could not be controlled and splitting of the MTE beam became impossible. Beam-based investigations on Thursday pointed to an incorrect current being sent to the PFW, which was confirmed and corrected by TE-EPC experts on Friday morning. The calibration error amounted to a factor of 3/5, but this was not evident on the measured current provided by the FGC and available in the CCC; the PFWs appeared nominal despite this important calibration error and no DCCTs are presently available for these circuits. An intervention by a TE-EPC specialist is planned on Monday morning at 8:30 am to improve the stability and regulation of the PFW and W8L circuits and, as a consequence, beams to SPS and AD will be restricted until midday. Setting-up will continue on MTE and multi-bunch LHC beams as well as AD, EAST and TOF beams. There is chance it will be completed by the end of the week.

RF setup was delayed because of priority for ISOLDE beams in the PSB.

Comment from **B. Mikulec**: A meeting needs to be organized to work out a solution for all the machines concerning diagnostics of FGC currents. There were similar issues in the SPS this year and in the previous year.

Answer by **C. Mugnier**: These are new systems and any change in regulation requires full commissioning of the system.

Comment from **K. Cornelis**: Currently calibration for both Setting and Acquisition is done together at the same time so it's no surprise that the two always agree. An error in a dipole magnet might not be too difficult to diagnose, but if this happens for a quadrupole in a transfer line it can take a long time to identify the problem.

Comment from **V. Kain**: I think the problem is a missing cross-check to assure the correctness of calibrations.

Question from **K. Cornelis**: Did anything change in the procedure? It is in place for many years now and the problems started only after LS1.

Answer from **C. Mugnier**: For the SPS case this year a DCCT was changed.

Comment from **V. Kain**: Someone has changed something without telling us. There should be a procedure to follow in such cases.

Comment from **B. Mikulec**: We asked in the past for independent analogue signal measurements of the currents (OASIS), but this was refused.

Comment from **B. Mikulec**: We definitely need to find a solution for the now and for the future, as the FGCs will be deployed everywhere.

Question from **M. Gourber-Pace**: Is this problem in the PS understood and resolved by now?

Answer by **M. Fraser**: I believe yes. I think that persons doing the intervention did not know the procedure well.

AD

T. Eriksson said that the AD status would be covered by his presentation at point 4 of the agenda**.**

SPS

K. Cornelis reported on the status of the SPS (Annex 6).

Setting up with beam started last Friday afternoon. INDIV and FT (3e12) beams were accelerated.

The new beam dump behaves well. Graphite went up to 60 degrees with no vacuum activity. It means that the thermal contact is good and the heat is efficiently evacuated.

During the weekend BPMs were checked and they do not perform as good as desired. Probably a second iteration of setup is needed.

On Monday measurements for beam based alignment were done.

20% error in QF and QD calibration was found: both reference and current were 20% too low. Fortunately, the beam was flying well and only the orbit correction showed a problem with the optics.

A BLM had a bad contact, which was fixed with temporary measures. Today there will be a less temporary fix done.

3. Summary and issues during PS HW commissioning

D. Cotte gave the presentation (Annex 7)

The assumed schedule of the hardware tests was followed. POPS tests were done in the afternoons therefore accesses were possible only in the mornings.

Encountered issues:

- On 4th April 6 cables for Oasis triggers were found cut what prohibited acquisition of the ejection signals. Quick reaction and fix from BE/CO: new cables were pulled and the system made operational on 13th of April.
- Vacuum leak on BTP.VVS20.
- Frequent trips of B8L and WFW.
- PFW tests were late because of access in the machine (safety) and regulation issues (new DCCT needs to be installed, which was requested already during the EYETS; described in length in PS report above).

- PR.XNO not ready (earth fault on DC cable).
- Missing B-Train during Dry Run.
- Lost BSF277 device in TT2 (OP was not aware that BI would remove this device).
- Several tests show up as failed in the checklist, however, all of them are not blocking ones.

Conclusions and comments:

- Polarity checks showed to be very useful: 34 out of 40 magnets were found inverted.
- The one week time given for Switchyard tests was too short
- Starting PS with beam on Easter Monday is not ideal. This is a French and Swiss school holiday period. Everything was therefore needed to be ok for beam on Thursday evening already for Monday. Of course the piquet teams were in place, however, in cases when the piquet needed a specialist help they were usually not reachable.

Question from **M. Gourber-Pace**: Why there was no B-Train?
A: I think this test was planned too soon and there was not enough time to prepare the B-Train.
Question from **B. Mikulec**: There were so many inversions, how could this happen? Is there no convention that is followed?
A: Inversions were on a patch panel in the middle between power converter and magnets.
Question from **B. Mikulec**: The convention used was the standard one?
A: Yes, the reference was a sheet from D. Bodard.
Comment by **B. Mikulec**: We should work out a procedure to minimize such problems.
R. Steerenberg: Thank you for the feedback concerning the schedule; we will take it into account for the 2018 planning.

4. Report on AD+ELENA shutdown activities and HW commissioning status

T. Eriksson gave the presentation (Annex 8).

The main point of the AD shutdown activities was the renovation of the magnets. Normally only bends needed repairs, but this year also the short QDN quads showed problems. One quad had to be repaired in situ because of difficult access and vacuum that was not broken in the sector.

The GBar experiment installed 1500 tons of shielding in direct vicinity of the AD machine. Complete survey in the vertical plane was done after several months and up to 0.5 mm offsets were found. Following a long discussion it was decided to postpone alignment since no orbit or acceptance measurements have been done yet. It is also expected that the floor will continue to sink for some more time.

During hardware tests the main issues were related to major modification of central timing for ELENA handling.

It took a long time (ADR: 7 days, ADT: 9 days from completion of DSO tests) to get the beam permit signed by all the parties. There was sometimes a 5h delay from signature to the automatic email informing about it.

Many issues during first beam setup: quite a lot of radiation alarms even though ¼ of nominal intensities. The beam in from the PS is not yet fully ready.

Comment from **M. Fraser**: Beam in the PS is ready, only some RF works are needed. It should be completed during the second part of this week.

Comment from **S. Hancock**: Already on Friday morning the beam was ready for AD, so what was happening during the weekend until now?

A: There were still several AD issues, very little could have been done during the weekend. Q: Was it only low intensity?

Comment from **S.Hancock**: No, it was beam with 900E10 or even more.

ELENA installation work completed except:

- Electron cooler, installation foreseen July -17
- LNI/LNE; 2 L pickups & 2 SEM devices
- LNE50 (Gbar line) completion

A safety review of the Gbar experiment showed several issues with their electron linac.

The machine commissioning uses a local 100 keV H- ion source. This was repaired after the 2016 HV isolation transformer failure and was ready again on February 15. On February 17 an electrical failure in the source damaged many components. After lengthy repairs/modification restarted again on March 15 at 85keV. New problems on April 11: fast vacuum pressure rise when applying nominal filament current. Vacuum leak suspected: re-surfacing of components, re-brazing, re-sealing etc. with the help of CERN workshops was not conclusive. Expert from Julich provided a modified filament to run at lower current; initial observations look ok.

SEM device next to the source is not useful because it always displays signals on all the wires, probably because the H- beam is polluted.

First beam capture tests were quickly successful. Beam survives well until starting the acceleration ramp. Waiting for the tomoscope to become operational to do further optimizations.

Comment from **S.Hancock**: The tomoscope is ready, but there was only half a day of quality beam so there was not enough time to set it up.

Question from **B. Mikulec**: What are the milestones for ELENA?

A: Install the electron cooler in July. Gbar will ask for pbar beam some time during the year. There are many delays at Gbar and schedule changes, so it is difficult to determine an exact date.

5. Schedule Updates

B. Mikulec presented the latest version of the injector schedule.

1st of May several activities start

- LHC commissioning
- East Area physics
- nTOF physics
- AD physics

Question from **D. McFarlane**: The duration of TS1 in May is confirmed?
Answer by **R. Steerenberg**: It will be 24h from beam stop to beam start, so cool down needs to be included. This could change only in case there would be necessary vacuum interventions.

6. AOB

No AOB.

Next Meeting: 2nd of May.

Minutes reported by P.K. Skowronski on April 27.