

# CONTROLS AND OPERATIONAL ASPECTS: GOING FROM COMMISSIONING TO OPERATIONAL REGIME - DISCUSSION

Chair : Reyes Alemany and Verena Kain – Scientific secretary : Delphine Jacquet  
Palais des lumières, Evian, France

## WHAT ARE THE WEAK POINTS OF OPERATION? (B.GODDARD)

B.Goddard's presentation explained that despite the general agreement that the 3 weeks of LHC operation were a success, some weak points have been revealed and should be addressed. The weaknesses were encountered in several operation aspects like equipment, tools, procedure, discipline and organisation. The discussion that followed the presentation is summarized next:

- Concerning the point that there was no clear definition of what needed to be achieved before to move to the next commissioning step, S.Meyers commented that the definitions were established, but as everything has been done in a rush, it hasn't been formally followed.
- For the over-injection problem, Giulia Papotti said that in case of beam with too low intensity, the SPS beam quality monitor (BQM) inhibited the SPS extraction, so low intensity beam should not be a cause of over-injection.
- In the presentation, it is explained that TIM communication glitches causes the interlock on powering/access status to switch OFF all the LHC power supplies by mistake. L.Ponce corrected that the source of the problem was not TIM but the JMS broker that is in the communication chain with the equipment. The latter was down because too many subscriptions were requested for the BLM system.
- In his presentation B.Goddard expressed a need to get an overview of all the collimator statuses. Ralph Assman commented that such a display wouldn't be useful to detect any problem, but one should rely on interlocks and alarms that will clearly point out any problem with collimator position. On the same subject, Alick McPherson said that the alarm system is a good indication of problems but the safety is only provided by the interlock systems. Markus Albert also stressed that the operation team should take the good habit to look more often at the alarm screen.
- During his talk, B.Goddard expressed his concern on the LHC safety. He said that nothing was really preventing operation to inject high intensity beam in the LHC, and too much unsafe operations were allowed. Mike

Lamont answered that only low intensity beam was supposed to be injected, and nothing dangerous has indeed been performed during the 3 weeks of operation. The potential for mistake will never be reduced to null, and one has to rely on a good coordination team that gives clear instructions to operation, and the operation team has to be trusted to follow them. He also reminded that there was a request to progress very fast, which was an acceptable requirement as only safe beam was injected. Then he pointed that everybody was learning from scratch to operate the LHC so the weakness showed were completely normal, and should nevertheless be addressed.

- Concerning operation in general, Walter Venturini pointed out that the procedures are not always up-to-date, so one should be more careful to have them correct to avoid mistake. Also Alick McPherson would like to have a better overview of all the LHC individual systems.

## HOW TO IMPROVE OPERATIONAL EFFICIENCY? (R.ALEMANY)

Reyes Alemany's talk gave some statistics on the 3 weeks of beam operation. She showed the beam availability ratio and explained the major causes of down time. Then she gave potential solutions for the biggest problems, and showed how the operational efficiency could be improved. The presentation was followed by a discussion reported as follow:

- The idea of restricting the access to the equipment to the sequencer only, the latter running only by the EIC from the EIC console was discussed: RBAC would be used, a super user created that would be the only one allowed. It was pointed out there are 2 persons on shift, so what is the use of the operator if he's not permitted to do anything?
- Ralph Asmann expressed his concern on the sequencer reliability. He said that if the sequencer does the wrong request to the equipment or load the wrong setting, it would not be detected because the equipment won't give any interlock as it is doing what requested. He wonders if this is safe enough for a run at 3.5GeV. Mike Lamont said that the sequencer is not a safety system, and safety is

always ensured by the machine protection system.

- Markus Albert said that for safety and efficiency, the key point is a good discipline and team work in the CCC. The EIC should always keep track of what is done by all the persons present in the LHC island.

## **RF-PERFORMANCE AND OPERATIONAL ISSUES (A.BUTTERWORTH)**

A.Butterworth gave a presentation that described the operational difficulties encountered during the 3 weeks of operation and the solutions that have been, or will be, put in place. Then he explained which part of the RF system is now ready for higher intensity and which is still to be done. Finally he said a few work on the readiness of the damper system for next start-up.

- One of the major problems RF faced during last run was the klystron collector that was damaged because it received too much power. The question of the problem criticality was raised. Andy Butterworth said that this problem has to be seriously addressed as there are only few spare collectors.
- The damper system detected a ripple in the cable response from pick-ups. This is under investigation, W.Hoffle said that the biggest noise is understood, but still a part of the ripple is unexplained.
- It was asked why there is no interlock when the RF is OFF for a cavity. A.Butterworth answered that it's possible to run with some cavities OFF, so the interlock should better be on the sum of all cavity voltage.
- O.Brunning asked if some instrumentation is available to check that the beam is in the right bucket. A.Butterworth answered that the mountain range application can be used for that.
- About the Schottky monitor, it was said that it would be available for the start-up.
- Ralph Asmann pointed out that the machine impedance could quickly become an issue, so the transverse dampers have to be commissioned soon.