

LHC Studies Working Group

Notes from the meeting held on 14 August 2012

A short meeting was dedicated to looking at the plan for the floating MD in week 37. The slides can be found at:

<https://indico.cern.ch/conferenceDisplay.py?confId=204073>

1. Floating MD schedule and update on LHC schedule (F. Zimmermann)

The most recent version of the LHC schedule was shown, featuring:

- a 24-hour floating MD foreseen in week 37 (8-hours for proton-proton rephasing tests and 16-hours for proton-lead tests);
- MD#3: a 5-day MD block in week 41 (so that results from the scrubbing run in week 39 can be fed into the MD program);
- MD#4: a 5-day MD block in week 47 (so that possible results can be used in physics fills before the end of proton run);
- a 24-hour floating MD, probably between MD#3 and MD#4.

2. p - Pb tests in floating MD (J. Jowett)

J. Jowett presented the preliminary plans for the p - Pb tests to be performed in 24 hours of floating MD time in week 37. The RF rephasing test is allocated 8 hours to test the procedure and hardware. At injection energy the two rings are filled with protons and then de-synchronized to a frequency difference of 58.8 Hz (corresponding to the p - Pb RF frequency difference at 4 TeV/c proton equivalent momentum). The rephasing procedure is then commissioned and the rephasing offset corresponding to having the collision of buckets 1 in ALICE is found (BPTX readings from the experiments are required). It was clarified that colliding bucket 1 in Alice would give the experiment some additional collisions as the abort gaps would also meet there. R. Schmidt thought there should be no problem on the machine side, but pointed out that this should be verified.

The remaining 16 hours target mainly the execution of a ramp with many p bunches and few Pb bunches. Circulating Pb is established for ring 2 for the first time in 2012. Few p and few Pb bunches are injected and ramped first, then many p bunches are injected and ramped (according to the new 200/225 ns spaced filling scheme, p with 10% nominal intensity). Measurements of emittance growth are planned. Additional tests, if time allows, include locking the RF frequencies or injecting p bunches with higher intensity. The tests will continue with a pilot physics run of up to 24 hours, in physics time.

D. Manglunki recalled that the Pb injections are single bunches. J. Jowett added that for protons a new scheme is used (200/225 ns protons; 24 bunches per batch). G. Papotti identified these as the beam requests to the injectors.

3. Input for CMAC6 presentation (roundtable)

F. Zimmermann and G. Papotti recalled the remaining MD priorities for 2012 (mainly: instabilities, 25 ns studies, quench tests, p - Pb tests, UFOs) and welcomed input from the working group to complete them.

T. Pieloni recalled the priorities for the beam-beam team, namely: long range minimum separation with 25 ns trains (minimum 48 bunch trains), noise studies, collisions with flat beam optics (optics being developed). M. Lamont added that an offset-leveling test with new octupole configuration in IPs 1 and 5 should be performed to verify whether instabilities are still observed.

F. Zimmermann reported the HL-LHC MD priorities received from Stephane Fartoukh: Large Piwinski Angle (number 1), next high head-on beam-beam tune shift with parallel separation levelling (with the new MO polarity ...), and then beta* levelling with the same priority as ATS (both already almost fully successful at the last MD).

J. Wenninger pointed out that it could be interesting to accumulate some experience on beta* levelling over a few fills, the drawback being sacrificing some luminosity production time. He also pointed out that the recent polarity changes in Alice and LHCb would slightly upset the settings.

J. Esteban Mueller recalled that the longitudinal stability studies needed to acquire more data at the flat top (3 h for data + 2 h for the rampdown).

W. Hoefle recalled additional priorities in the RF group: the batch-by-batch blow up, the commissioning of the longitudinal damper, studies on ADT noise and beam-beam. The studies of a tune measurement feasibility from ADT pickups is ongoing as operational development. Additionally, the gain flattening of the damper is to be studied, as it might have a negative impact on the system noise.

R. Bruce listed the priorities of the collimation team:

- a study of the hierarchy limits (how far can the secondaries go with respect to the primaries? using the ADT in continuous excitation mode, the secondaries would be moved forward and when the hierarchy breaks would be checked; moreover, how fast can the hierarchy be recovered?);
- repeat the collimator based quench test (generate massive losses on the primaries to check the limits in the dispersion suppressor);
- perform loss maps in different conditions (e.g. during the ramp, by using the ADT blow up);
- re-measure the collimator induced impedance to check a possible degradation with time due to radiation (N. Mounet recalled that 2011 and June 2012 measurements were very similar);
- measure both sides of the aperture (lower priority).

M. Sapinski recalled that ADT losses seem slow compared to UFOs at 4 TeV. A working group will meet in September to finish the analysis and discuss priorities for quench tests. R. Schmidt stressed that quench MDs have different aims, while the collimator test aims at seeing the limit of the collimation system and might not involve quenches, other tests aim at real quenches. D. Wollmann also added that slow losses give a different kind of understanding.

After a question by F. Zimmermann, J. Wenninger answered that there are now no settings available for a combined ramp and squeeze.

E. Metral recalled the need for studies of emittance growth in the LHC. V. Kain answered that studies of physics beams with the BSRT and test ramps with wire scanners are ongoing. F. Roncarolo added that the new BSRT server for the fast scan is absolute priority, and that a strange behaviour on beam 2 is observed with high intensities. G. Papotti recalled the studies with non-colliding bunches in parallel to physics operation for the observation of long time scale phenomena. V. Kain recalled

the need for more studies of IBS emittance growth with SPS Q20 versus Q26 beams. F. Zimmermann confirmed that SPS Q20 and $h=9$ developments are ongoing within physics time.

F. Roncarolo recalled that a few hours per MD block suit the BI needs for studies.

T. Baer and J. Wenninger recalled the need for UFO data with 25 ns beams, ideally with ~ 1000 bunches at the flat top.

E. MacLean recalled optics studies: MQY transfer function, skew sextupole families checks. Checks of octupole families would require little additional time as they were mostly carried out recently during the SPS wire scanner replacement.

E. Metral also added that more time will probably be required for instability studies.

Next meeting to be held on 4 September to decide on the priorities for MD#3, invitations will be sent in due time.

Giulia Papotti

List of participants

AQUILINA	Nicholas	TE-MSC-MDA
BAER	Tobias	BE-OP-LHC
BRUCE	Roderik	BE-ABP-LCU
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Excused: M. Giovannozzi.