



49th Meeting of the HL-LHC Technical Coordination Committee – 19/04/2018

Participants: A. Apollonio, V. Baglin, I. Bejar Alonso, O. Brüning (chair), H. Burkhardt, R. Calaga, O. Capatina, S. Claudet, R. De Maria, B. Delille, B. Di Girolamo, P. Fessia, F. Gerigk, M. Giovannozzi, E. Gousiou, E. Jensen, R. Jones, H. Mainaud Durand, P. Martinez Urios, M. Martino, R. Martins, E. Metral, F. Micolon, M. Modena, T. Otto, D. Ramos, S. Redaelli, L. Rossi, F. Sanchez Galan, M. Sosin, L. Tavian, R. Tomas Garcia, D. Wollmann, M. Zerlauth.

Excused: C. Adorisio.

The slides of all presentations can be found on the [website](#) and [Indico pages](#) of the TCC.

O. Brüning recalled the actions from the 48th HL-LHC TCC.

On the action for WP12 to add a reference to the specifications on alignment errors in the ECR on the modification of the shielded beam screen, V. Baglin commented that he will make sure it will be included.

On the action for WP2 to evaluate the implications of having shorter skew quadrupoles and increased integrated strength in some other circuits, M. Giovannozzi pointed out that the discussion already took place during the WP2 meeting on 10th April and the resulting considerations have been included in the ECR prepared by E. Todesco.

ACTION: E. Todesco should present at the TCC the ECR including the evaluation of the implications of having shorter skew quadrupoles and increased integrated strength in some other circuits for HL-LHC.

On the action for WP5 regarding the procedure for bake-out of the jaws of the 11 T dipoles in case of intervention, S. Redaelli pointed out that this requires the involvement of several colleagues from other WPs. He will coordinate the discussions and report the outcome to the TCC.

The minutes were approved.

FSI system feasibility from survey vs cryogenic load due to the needed window – M. Sosin – [slides](#)

M. Sosin reminded the TCC about the FSI (Frequency Scanning Interferometry) system, providing absolute interferometric distance measurements. The system was successfully used for crab cavity position monitoring for the SPS tests. In this case both the FSI and BCAM (Brandeis Camera Angle Monitoring) were used for cross-validating the alignment. The

achieved precision is better than 50 μm . Several cool-down cycles were performed, showing the impact of temperature changes on the position of the cavity inside the cryo-module. A vertical movement as a result of the suspension system contraction of ~ 1 mm was measured, while the radial displacement was negligible.

M. Sosin presented the FSI integration layout for the inner triplet, based on 3x4 FSI heads for each cold mass, resulting in a total amount of 48 FSI heads per triplet. As a proof of concept for this setup, a test was carried out on a dipole in SM18. Several cool-down cycles were performed, highlighting a high sensitivity of the FSI system to cryo-condensation. This effect strongly depends on cryostat cleanliness, vacuum quality and cooling scheme. The adopted solution is to have a special design for insulated targets that allows to cope with the cryo-condensation effect. The integration studies for the triplet cryostat are presently ongoing.

O. Brüning asked if any problems have to be expected for the crab cavities in the long term. O. Capatina and E. Jensen mentioned that no problems are expected, so there's no plan for any changes. O. Capatina added that one target was indeed lost, but it has to be investigated when opening the cryostat before LS2 what was the real cause for the problem. S. Claudet commented that from the cryogenics point of view the newly proposed solution looks very promising.

M. Zerlauth asked about the plans for final integration in the tunnel and the potential impact on the available transport volume. M. Sosin explained that what was presented in the slides, was the setup for the tests. The real configuration will have no impact on the transport volume.

R. Tomas Garcia asked about the duration for a measurement interval and if the system could also detect vibrations and faster movements. M. Sosin commented that for the current system the duration depends on the number of channels, for a few channels it is 2 sec, for the crab cavities (32 channels) it is 4 sec.

D. Ramos pointed out that for a final validation of the system the string tests will provide the opportunity for testing in a long cryostat, this will provide the final evidence for the feasibility of the system.

Cabling needs for SM18 extension – F. Gerigk - [slides](#)

F. Gerigk presented the draft layout for the SM18 extension. The present structure will be extended by 6 m. The existing wall will be kept to separate the extension and preserve a clean and temperature-controlled environment.

F. Gerigk recalled that the present request for cabling in SM18 only concerns lights, the powering for the entrance doors for trucks, 5 power outlets, an electrical board and powering of the crane. He remarked that the cabling works are already planned by EN/EL and are expected to be finished by mid-October 2018, with no impact on LS2 activities.

L. Rossi and O. Brüning commented that, as the cabling works are foreseen to be finished in October 2018, indeed no impact should be expected on LS2 planning and activities. They

suggested to clarify this point with J.-M. Jimenez. E. Jensen commented that he will contact J.-M. Jimenez and EN/EL for further clarification.

AOB: ECR on installation of TANB – F. Sanchez Galan - [slides](#)

F. Sanchez Galan reminded the TCC about the necessary modifications to the layout in IP8 to accommodate the TANB, particularly affecting the vacuum elements and the BPMs. A detailed description of the changes by WP15 is available and these have also been validated by WP2.

P. Fessia suggested removing the details on the integration part from the ECR and only adding a reference to the EDMS integration document, in order to minimize the number of changes in case of future new releases of the document. F. Sanchez Galan explained that he was asked to make the content of the document self-consistent, but he will check if it's possible to modify it.

O. Brüning concluded that, as a next step, the ECR should be presented in the LMC, to be decided if the related work will be performed in LS2. The required time for modifications of the layout in IP8 was estimated to be 10 weeks per side.

M. Giovannozzi stated that the change has been accepted by WP2, but that some inconsistencies in the information available in the databases were found, this triggered an initiative with WP15 to further verify the stored data.

AOB: outcome of C&S review – L. Rossi

L. Rossi recalled that the slides of the closeout session of the C&S review are available ([here](#), it is recommended to **not disseminate this presentation** as it is a draft version and some modifications are still possible). Overall the feedback was very positive, but the CERN management decided to keep the allocated budget for the HL-LHC project at 950 MCHF.

L. Rossi recommended all WPs to work within the allocated budget, i.e. the present CtC. He stressed the importance of keeping track of undercosts and overcosts; however for the moment the budget is not increased in case of overcost, nor decreased in case of undercost. While for increase and decrease of scope the budget will be actually readjusted: this for all WPs. "Compensating" overcosts discovered in the last two years with descoping is not allowed. For any clarification please contact L. Rossi or B. Delille.

The hollow e-lens would have an extra cost to completion of 10 MCHF for the project. L. Rossi stressed the importance of possibly having in-kind contributions whenever possible, as this can facilitate the approval of new projects for HL-LHC as the hollow e-lens. The extra cost for the project for each increase of scope would be the same but the CERN budget would be relieved, making it less difficult to accept a formal increase of scope.

Purchase of low-impedance collimator material for primary collimators – S. Redaelli - [slides](#)

S. Redaelli presented the draft of the ECR concerning the purchase of materials for the low-impedance upgrade of the primary collimators for HL-LHC. This activity was initially not included in the scope of WP5, but the significant savings achieved for the industrial production of MoGr compared to the costs estimated during the R&D phase will allow for the procurement of MoGr for the production of 4 primary collimators (plus one spare), for a total cost of 300 kCHF. This will not exceed the allocated budget for WP5. The related costs can neither be covered by the consolidation project nor by the collimation project (the allocated budget is about 2 MCHF), as this would be a new design for the primary collimators. S. Redaelli recalled that this decision was agreed after summer 2017 before launching the production contract for the primary collimators.

L. Rossi commented that this change should be classified as an increase of scope for WP5. This is a case where an increase of scope is compensated by an undercost. This in the future will not be allowed. L. Rossi asked for a quantification of the gain coming from these new collimators. S. Redaelli explained that the gain is driven by a reduction of the impedance by a factor 2 in each collimator. This mean a 10% reduction of current required in the Landau octupoles to stabilize the beams, which is a lot considering that this comes from 2 collimators per beam only.

S. Redaelli recalled that what described in the ECR was approved in the project steering meeting and it was also presented in, and endorsed by, the C&S review. B. Delille commented that it was presented in the C&S review as an increase of scope, not as an overcost.

L. Rossi concluded that, given the advanced state of this option, the relatively small amount involved and the effective gain for the machine operability, it is fine to go ahead with the ECR and the re-definition of the scope within WP5.

O. Brüning announced the next HL-LHC TCC meeting, which will be held on 24th May.