



EDMS: 2079631

International Review of the Crab Cavity system design and production plan for the HL-LHC

Objectives of the Review:

The CC system is a critical equipment in the HL-LHC project. Following the construction of the first HL-LHC CC cavities at CERN and in the US, and the crash program for the SPS DQW cavity cryomodule construction and installation in the new SPS facility, the first tests with proton beam in a CC were successfully achieved in the SPS during 2018. The final design of CC and the complete cryomodule is being finalized, both for DQW (double quarter wave) and RFD (RF Dipole) types, while the construction of a second complete cryomodule prototype (RFD type) is under construction by CERN and UK. The in-kind contribution from US-AUP (all dressed cavities of RFD type), UK-STFC and Lancaster U. (four DQW cryomodule assemblies) and Canada-Triumf (five RFD cryomodule assemblies) are agreed or in final negotiation stage. The construction of the DQW jacketed cavities by Industry for CERN is already under way.

The project management calls this review to assess if the present design of the cavities with their cryomodules and all ancillaries is adequate to meet the required performance and if the production plan is well harmonized with due margin (considering the complex scheme with many in-kinds) in the HL-LHC schedule.

Mandate:

Review the design status and production planning for the HL-LHC Crab Cavity system.

The review panel is charged with the following Charge Questions:

CQ1: Have the experience and lessons learned from the first phase of CC construction in the US, CERN and UK, and in particular the SPS crash construction program, successfully been implemented into the HL-LHC Crab Cavity design and construction program?

CQ2: Did the SPS beam tests show relevant results to extrapolate to HL-LHC and what are still the open questions [e.g. different beam and bunch parameters in the SPS] and to what extent are these results affecting design choices for the final Crab Cavity systems?

Are we ready to launch tender for the RFD pre-series cryomodule? Is the UK plan for RFD pre-series cryomodule production and assembly sufficient?

CQ3: Is the Crab Cavity design (including cryomodule) ready for launching the series production? If any, what points are still being optimized/iterated on for the pre-series production - both for the DQW and RF Dipole designs - and what points need to be addressed with the RF-Dipole prototype tests in the SPS?



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CQ4: Are the auxiliary components for the Crab Cavity system, like LLRF feedback, controls and power sources, sufficiently far developed for this stage of the project? If any, what support systems need further attention over the coming years?

CQ5: Is the baseline production schedule for the RF-dipole and DQW RF systems well adapted to the overall HL-LHC schedule [are the potential critical milestones in the overall CC production matched to the HL-LHC schedule]? Is the planning appropriately considering the boundary conditions implied by the distributed production planning with the above-mentioned in-kind contributions? Is the work framework and management adequate to manage such complex multiple interfaces system? What are the risks inherent to the current production and testing planning?

CQ6: Is CERN ready to finalize the agreements with the international partners on the key performance parameters and acceptance criteria & procedures? – Acceptance criteria & procedures are in preparation for the different sub-components.

CQ7: Is the Quality Plan for the Crab Cavity production addressing sufficiently the risks throughout the production phases at the various partner laboratories [cold tests after each transport versus visual inspections and mechanical measurements etc.]?

Review link persons:

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Dates and Place:

19 afternoon - 21 June 2019 at CERN, room 774-R-013