Minutes of the 34th Collimation Upgrade Specification Meeting 21st of February 2014

Participants: C. Adorisio (CA), A. Bertarelli (AB), R. Bruce (RB), M. Karppinen (MK), A. Lechner (AL), A. Marsili (AM) (scientific secretary), D. Mirarchi (DM), S. Redaelli (SR) (chairman), R. Rossi (RR),
Remote: R. de Maria (RdM), T. Markiewicz (TM) (SLAC), J. Molson (JM), L. Nevay (LN) (RHUL), B. Salvachua (BS), N. Sammut (NS), M. Serluca (MSe). M. Tomut (MT).

Indico event here.

1 Status of the 11T cryo-assembly design and integration (D. Ramos)

Slides are available in pptx or pdf.

1.1 Summary of the presentation

DR gave an update of the developments which took place since the last presentation (in January 2013) about the integration of the DS collimators. The talk also included all the required features, the possible integration issues and the new concepts in development. One of the main issues is the longitudinal space: the two short 11 T dipole and the collimator must fit in the space of the previous 8.3 T dipole, which is 15.66 m long. Obviously, we must insure the continuity of all lines, and some must remain straight: the beam pipes, but also the heat exchanger pipe. The aim is to achieve full interchangeability with a standard dipole, in order to not change the neighbouring magnets: the connections must remain the same as the ones of a standard dipole.

The choice of a warm collimator provides many advantages, including the decoupling from the cryostat. This means that the collimator can be removed, replaced and aligned without warming up the arc, which is simpler and faster. The collimator design fits both beams. The main issue for a cold collimator was the vacuum, and the reason why it was discarded. Vacuum is still an issue in the current design, but a room temperature collimator vacuum is safe for bake-out, and operated and maintained independently from cold beam vacuum. There must sector valves on both lines. As a baseline they are RF-shielded, thus large and difficult to integrate. The thermo-mechanical issues are also major, and the design of the busbar (thick copper stabiliser) has to comply with strong requirements of temperature variation.

Before the 11 T magnet development program, a cryostat bypass called QTC had been designed. The current line of action is to use as much as this design as possible. However, a different assembly approach was needed to avoid possible distortions during welding. The new approach is to consider two independent cold masses for the two 11 T dipoles, which can be aligned independently. They integrate bellows and extension joints to allow interconnecting afterwards in the tunnel. The collimator would be supported and aligned independently. This would allow and easier access for in-situ repairs. In addition, the existing TCLD collimator design could be used with modified supports. The whole interconnecting was designed independently from the collimator, simply reserving its volume.

DR presented the different places where longitudinal space was gained, since the design with existing parts was too long for the available space. Several parts could be optimised, to reach a total length fitting in the space of the 8.3 T dipole. The design work will start now. DR presented the status of the all different installation topics. Two possible designs for the bus bars are under study: integrated or externally routed. The vacuum vessel has been designed taking into account the stress analysis.

In conclusion, a complete update of the integration studies was given. A lot of issues have been solved, and efficient and versatile solutions have been proposed. The integration is well ongoing, but a lot depends on the feasibility of routing the bus bars in the available space. If this proves to be not possible, a lot of elements will have to be changed and the concept must be reviewed.

1.2 Discussion

SR asked if there was any identified major obstacle from the vacuum aspect. DR answered that it is not the case, and the main issue for now are the busbars, which have to pass through many components. But this issue is nearly solved.

2 Update on Update on BDSIM development (L. Nevay)

Slides are available in pptx or pdf.

2.1 Summary of the presentation

LN gave a short update on the last issues faced during the development of BDSIM. The main issue was with the closure of the ring: after importing the optics from MadX file, a difference of 100 μm was found in the transversal planes. Further investigations showed that it is not an error coming from BDSIM: the same mismatch also exists in MadX. It doesn't appear to be an issue with precision, and changing the precision does not fix the issue.

This problem is not visible in SixTrack because the ring is modeled as a linear machine with no continuity between the two ends: the final distribution at the end is passed to the beginning again.

The next step is to evaluate how serious this issue might be.

2.2 Discussion

SR suggested forwarding this issue to the optics team (RdM) for follow-up [**action: Coll. & optics team**]. JM mentioned that this issue did not come up with the Merlin code.

3 A.O.B.

MK mentioned that prototypes of the 11 T magnets are currently being tested at Fermilab, and results will be available in April.