WP14 Coordination Meeting: TDI e-cloud studies

July 25th, 2017, 865-1-D17, 10:30 – 12:00

Present: M. Barnes, C. Bracco, G. Iadarola and A. Perillo Marcone

Agenda: https://indico.cern.ch/event/654583/

The talk on "Update on TDIS impedance studies" is postponed to the next meeting on August 29th.

e-cloud on TDI (G. Iadarola on behalf of G. Skripka)

E-cloud studies performed on the TDIS allowed identifying a clear dependence between the electron flux and both the relative delay between the two counter-rotating beams and the TDIS gap. This was the motivation to try to understand if e-cloud might have contributed to the vacuum anomalies which were observed in 2016 at the TDI in point 8 and which could be mitigated by reducing the parking gap from 55 mm to 40 mm. The studies were performed assuming a uniform SEY and different gaps; they showed that:

- Multipacting thresholds strongly depend on the bunch intensity:
  - For HL-LHC beam parameters (2.2e11 ppb) mutlipacting is always stronger in presence of the two beams and gets maximum for a relative delay between the two beams of 12.5 ns
  - For LHC (1.1e11 ppb) the presence of the second beam is not systematically increasing the e-flux and the highest current is recorded for a 0 ns relative delay.
- The different geometry of the TDI with respect to the TDIS does not play any relevant role in e-cloud buildup

- The electron flux on the walls increases with the gap and, depending on the material and the level of conditioning, it starts appearing for gaps larger than 15-20 mm. No saturation is observed for the TDI.
- A maximum heat load of <50 W is expected for the highest SEY.

E-cloud clearly depends on the TDI gap and is expected to be higher for larger gaps. This could partially explain the vacuum spikes observed in 2016 but not the asymmetry between IR2 and IR8 and the "runaway" effect which caused several dumps. Vacuum group is carrying out parallel studies to evaluate the expected behavior for the different coating of the Al frame of the TDI in IR8 (Ti) and in IR2 (Cu). The pumping capacity of the vacuum system is also taken into account to assess if an e-cloud induced pressure spike might have triggered the observed "runaway" effect. Once vacuum studies will be completed Antonio will give a status updated at the LMC (some when in September).

As a general recommendation, during the scrubbing run the TDI (and in future the TDIS) should indeed be opened after injection to allow an efficient and reasonably fast reconditioning.

Actions: SEY measurements should be performed on the selected materials for the TDIS jaws (Antonio)

AOB

Antonio and Mike will consider the possibility of combining orders for PT100 to be used in the MKIs and TDISs.

The ceramic tubes and samples for the MKI prototype were shipped to CERN. The samples will be sent to M. Taborelli for SEY qualification. The chamber will be mounted in the magnet in the next weeks. SPS measurements on the liner could not be performed yet. **Actions: Mike will check if any additional e-cloud study and calculation is needed for the prototype and let Gianni know about it.**