Impedance meeting
16 November 2015

Presents: M.Barnes (MB), M.Beck (MB), N.Biancacci (NB), L.Carver (LC), F.Caspers (FC), H.Day (HD), A.Grudiev (AG), T. Kaltenbacher, (TK) E.Métral (EM), F.Paciolla (FB), A.Passarelli (AP), B.Salvant (BS), N.Wang (NW), E.Wildner (EW), A.Valimaa, (AV), C.Vollinger (CV), W.Zeuner (WZ).

The slides can be found at http://indico.cern.ch/event/462152/.

Request for RF-heating calculations for new CMS beam pipe (WZ):

WZ presents the request for RF-heating calculation for the new CMS beam pipe. For radiation issues few changes are requested. The material of the pipe will still be Al 2219 (standard at CERN) chosen for mechanical, vacuum and radiation reason. The new upgrade will remove a step transition to prolong the existing pipe cone.: the angle for transitions is unchanged and equal to 15° as old design.

FC suggests to study an S-shaped transition. BS recommend to be careful because we could make a cavity. AG comments that the new design should be better from an impedance transition point of view, but the resistive wall should be checked. WZ asks the effect of the present flanges: FC replies that trapped modes will be present but are not relevant. Anyway we have low shunt impedance but high Q modes. BS reminds that we could have 100 W induced from the beam if falling on the line. FC suggests to put AMC at the flange without affecting the aperture (inner loop, little pin?). WZ informs that the thickness of the pipe is 3 mm. BS comments that it is quite thick. FC reminds that Al is a bad radiator and we should make it black on the back side for heat transfer improvement.

WZ shows a bellow in the design. Normally the bellow is shielded. FC comments that we should carefully check how it is shielded.

BS asks for temperature probes. The estimations should be done by the end of January.

Action for CMS: provide 2D and CATIA drawings.

Status of MKI impedance studies (HD):

HD presents the heating simulations and observations on the MKI: uneven heating is observed and we would like to know where higher losses are located. The longitudinal impedance curve couples the 40 MHz lines. Power loss is measured as 52W/m and investigations are ongoing to understand why it seems that higher temps are located at capacitively coupled/upstream end. BS comments that the TDI, the beam screen and the MKI is the most critical equipment for HiLumi-LHC. HOM monitor reveals that the ferrite ring takes 50 % of the power loss. This is partly a good news since the losses do not go in the ferrite yoke. FC states that, for better HOM damping, we could use combination of ferrites. TB comments that we have already 2 types there and the Q factors are between 10-100.

FC states that we could use an optical fiber to measure where the resonant trapped mode is, or apply the wire resonant method changing the load to move the fix points.
From machine observations is seems we under-estimating the power loss given by the simulations

The transverse impedance has been measured displacing a single wire and analyzed assuming top/bottom and left/right symmetry. In the case of the MKI this is not strictly speaking true. HD shows that the transverse impedance is very high (as the error bars) and might be a concern.

**Update on hot topics and RF measurements (BS):**

- CATIA access: BS will try to have read-only access for the team or for selected people.
- AFP roman pots: 1.4 GHz resonance measured from CV and TK.
- CV will check the status of the SPS wire scanner design.
- PS impedance model: kickers will be half removed for LIU (we will have either MTE or CT extraction).
- SPS access required to measure the effect of flanges. FC comments that we do not need enamel flanges at all.