

HL LHC: impedance considerations for the new beam screens in IR1 & 5 (update)

N. Mounet, C. Zannini and E. Métral

Acknowledgements: G. Arduini, C. Boccard, G. Bregliozzi, L. Esposito, S. Fartoukh, R. Jones, R. Kersevan, N. Kos, A. Mostacci, A. Nosich, B. Salvant, M. Taborelli and E. Todesco

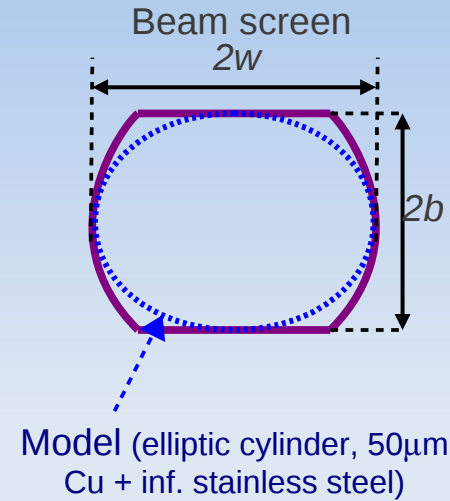
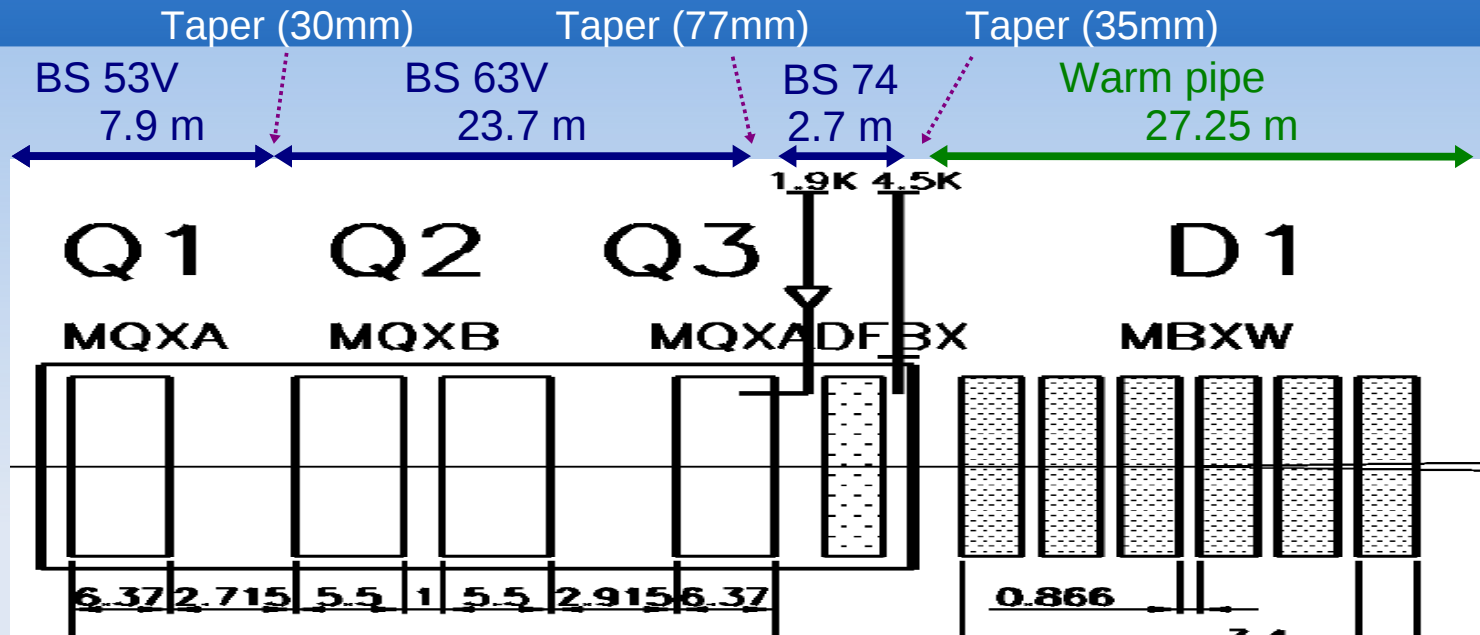


HL LHC: impedance considerations for the new beam screens in IR1 & 5

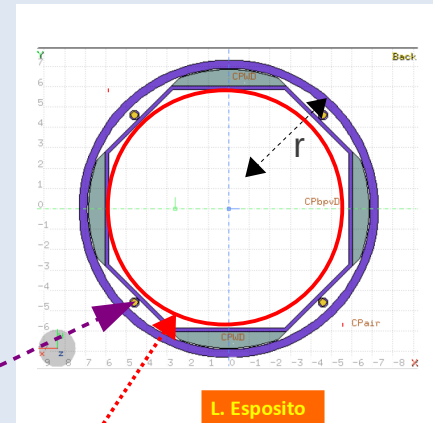
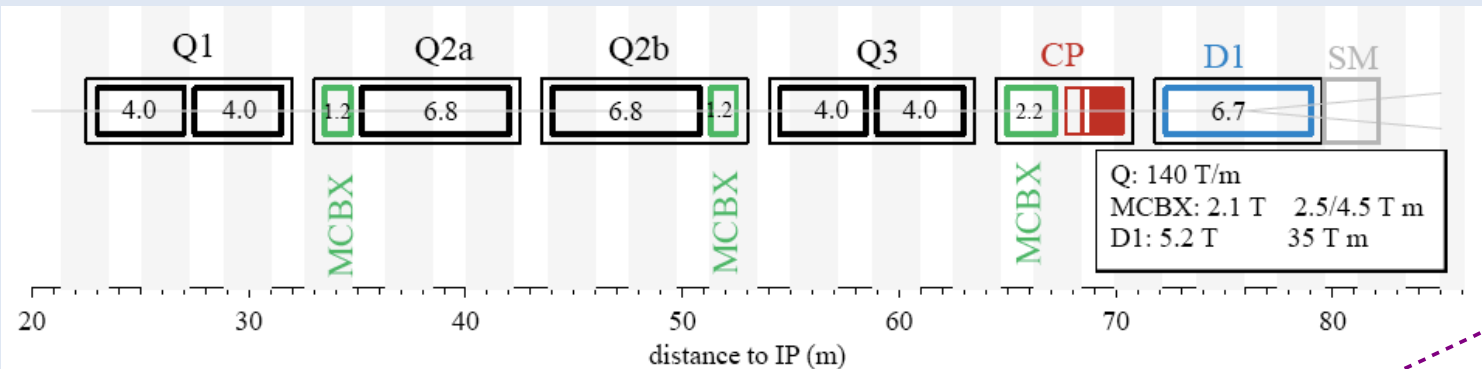
- Reminder on current and HL-LHC final triplet layout and beam screen geometry.
- Power loss estimates: see WP 2 task leader meeting, 01/07/2013 (estimates unchanged).
- Updates on beam screen contributions on total impedance budget.

HL LHC triplet layout (IR1 & 5)

Old



New



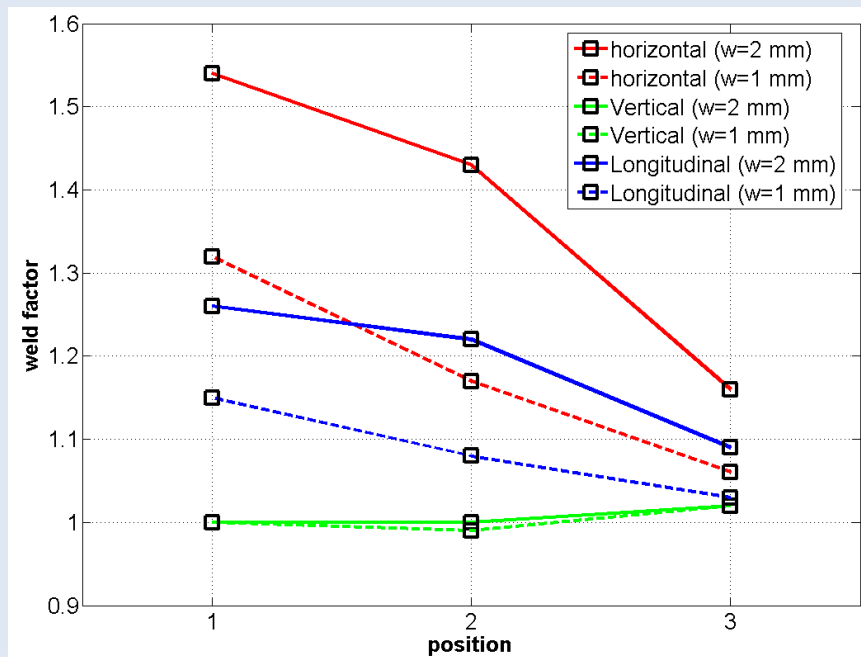
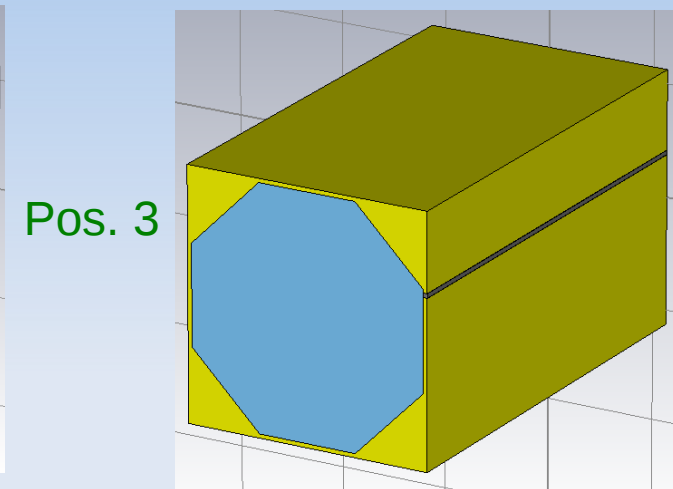
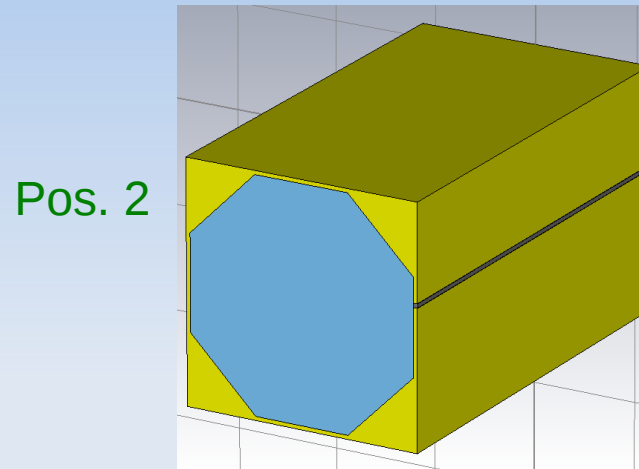
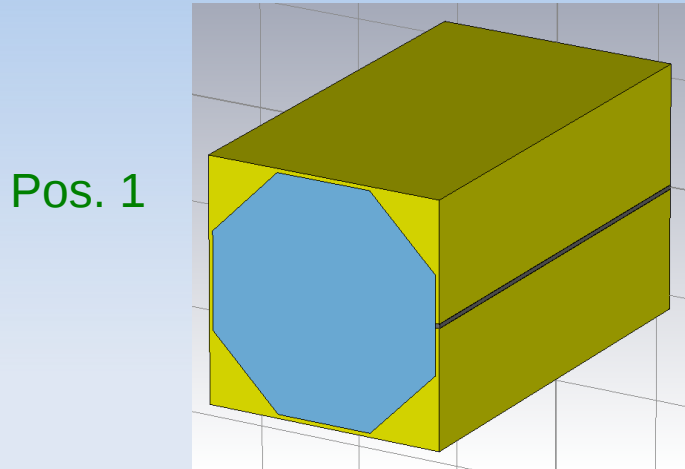
E. Todesco



Model: s. steel cylinder
- with 0.5µm amorphous carbon "aC" ($\rho=10^{-2} \Omega \cdot m$ – M. Taborellic) and 50µm Cu.

Resistive-wall impedance of new beam screens: impact of the weld

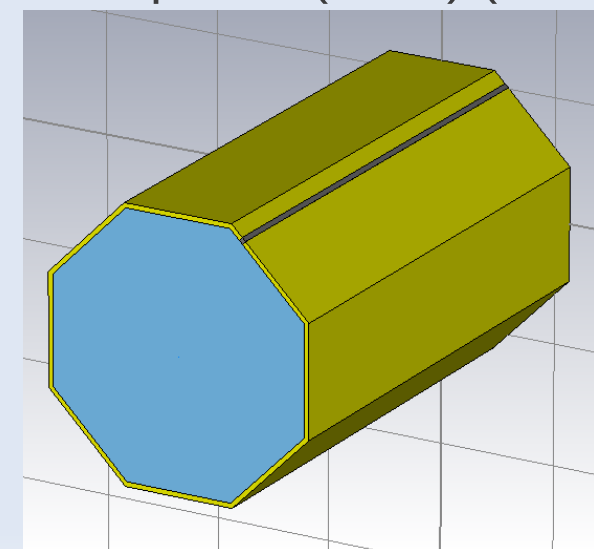
- 3 different positions tested, with either 1mm or 2mm height (CST):



Finally, baseline close to pos. 3 (2mm) (but in another corner):

⇒ Much smaller impact of the weld than in current beam screen.

C. Zannini



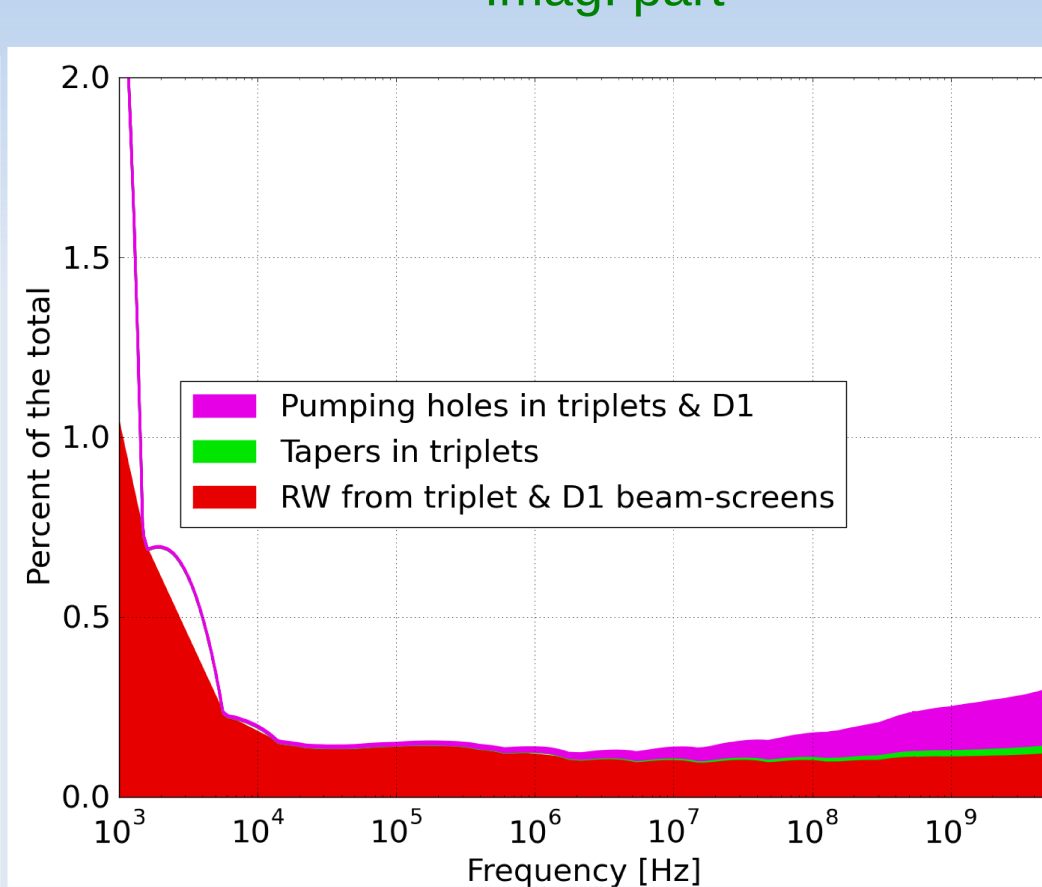
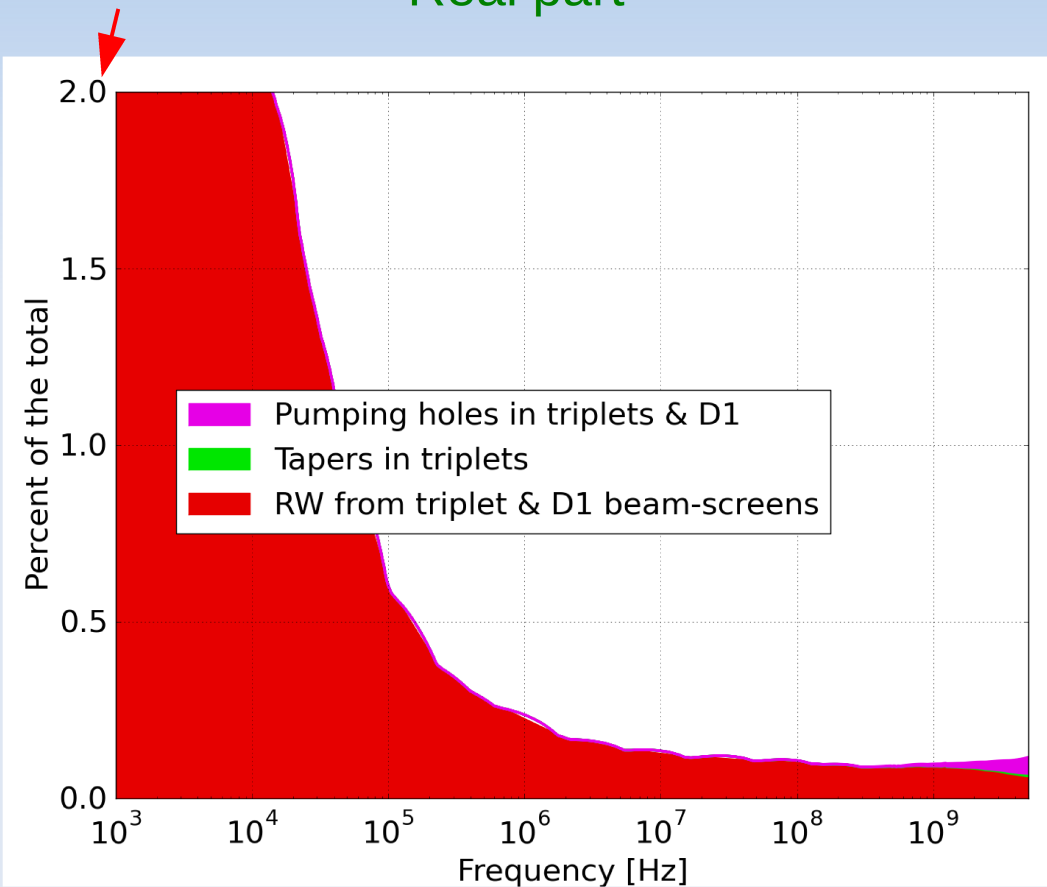
Contribution from the beam screens (and tapers) to the total HL-LHC impedance

- Contribution in percent (vertical dipolar)

This is 2 % !

Real part

Imag. part



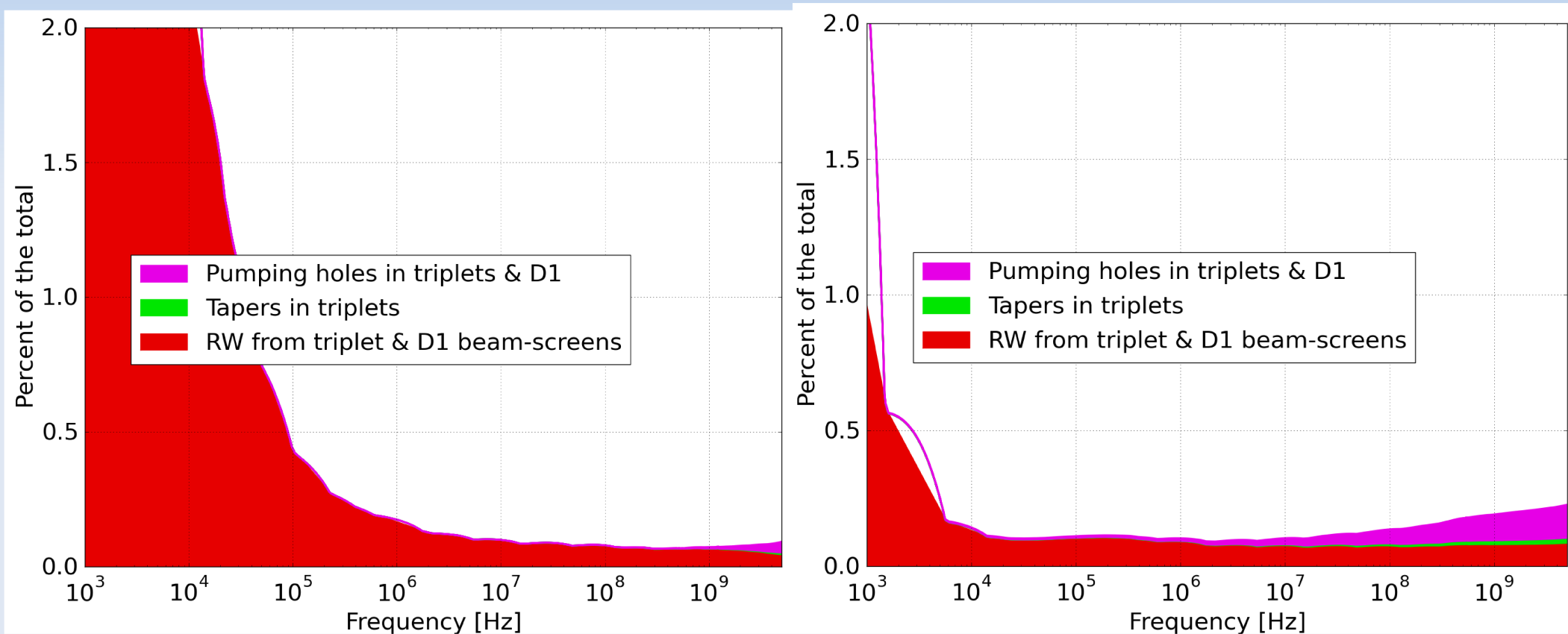
- small, especially at high frequency,
- even if pumping holes coverage is increased to 4%, contribution of pumping holes is marginal.

Contribution from the beam screens (and tapers) to the total HL-LHC impedance

- Contribution in percent (horizontal dipolar)

Real part

Imag. part



→ **small, especially at high frequency,**

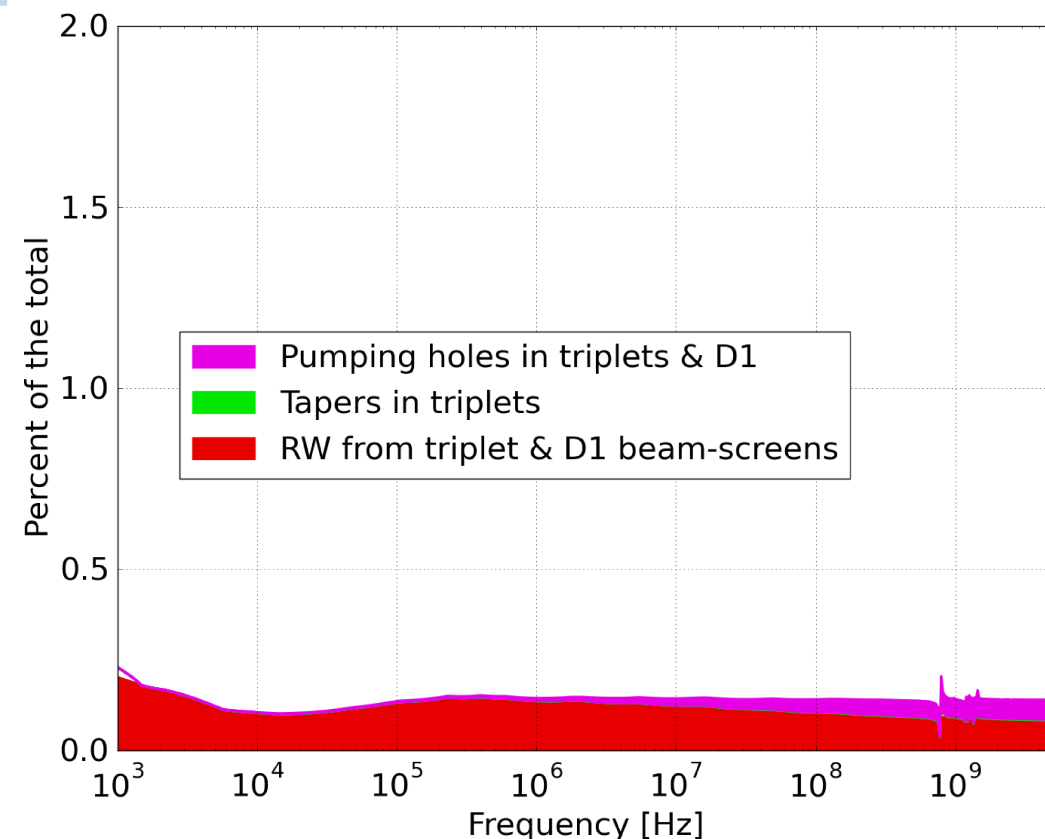
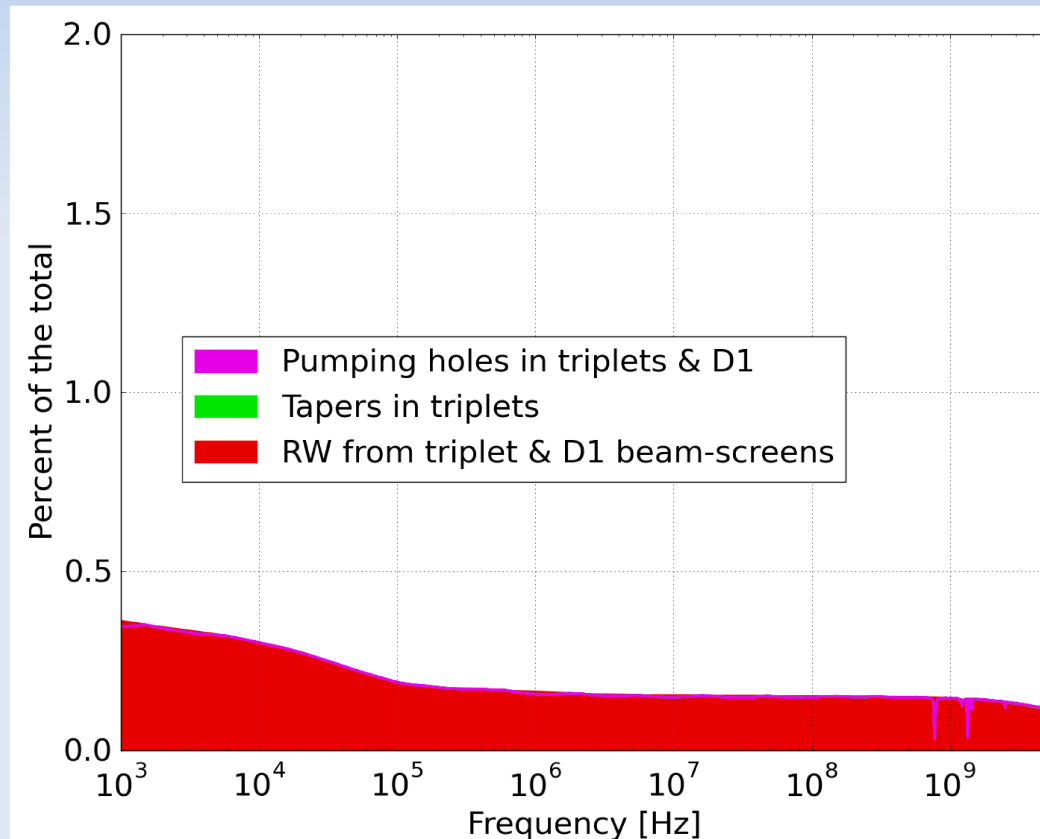
→ even if pumping holes coverage is increased to 4%, their contribution is marginal.

Contribution from the beam screens (and tapers) to the total HL-LHC impedance

- Contribution in percent (longitudinal)

Real part

Imag. part



→ **very small,**

→ even if pumping holes coverage is increased to 4%, their contribution is marginal.

Conclusions on total impedance

- Beam screens from the triplets contribute **very little** to the total HL-LHC impedance budget (less than **0.5%** at high frequency, even in worst case scenario).
- Main contribution of beam screen is **resistive-wall** (especially at low frequency), for which we can do little (except increasing the aperture or increasing the β^* ...).
- Pumping holes contribution is very small (0.2% at most), even in worst case scenario of 4% surface coverage.