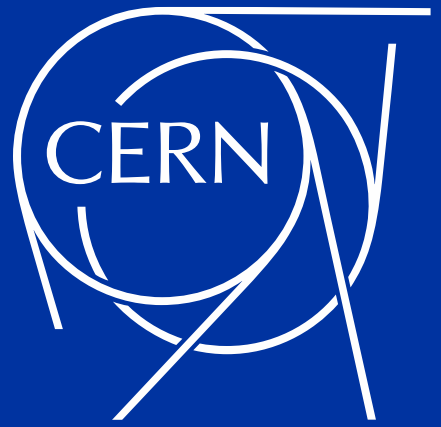
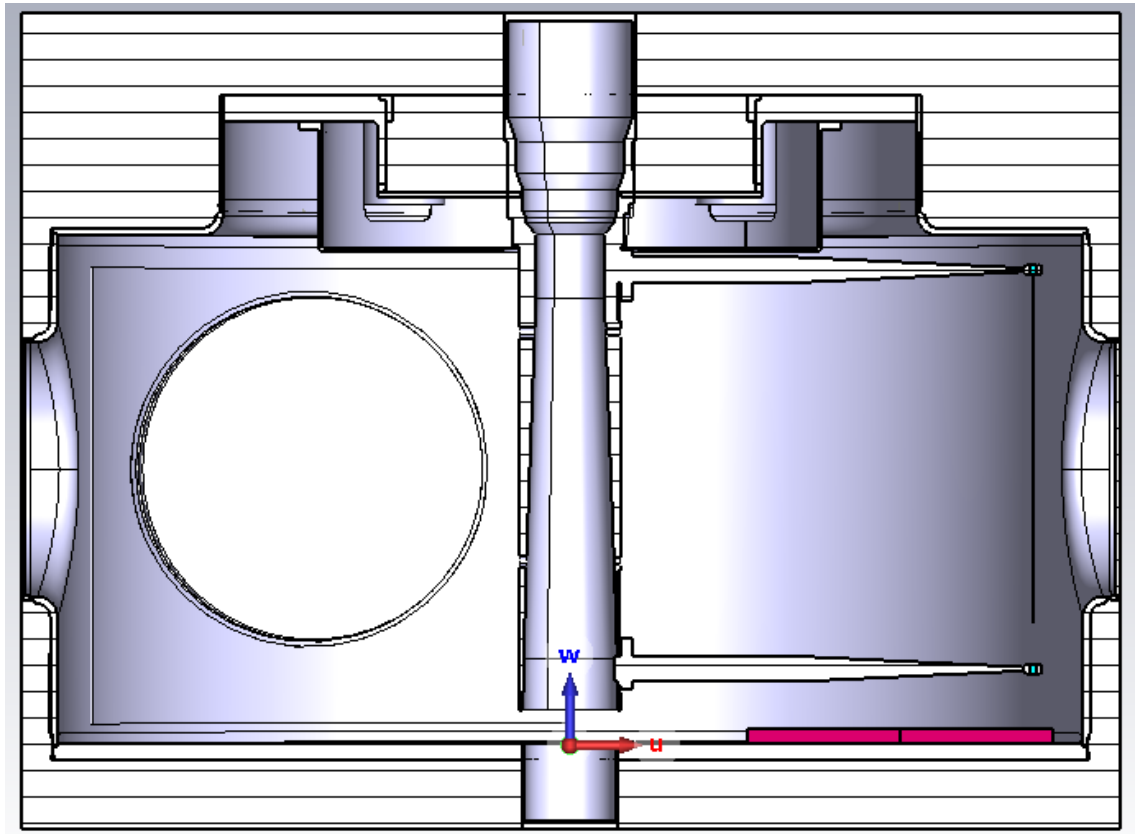
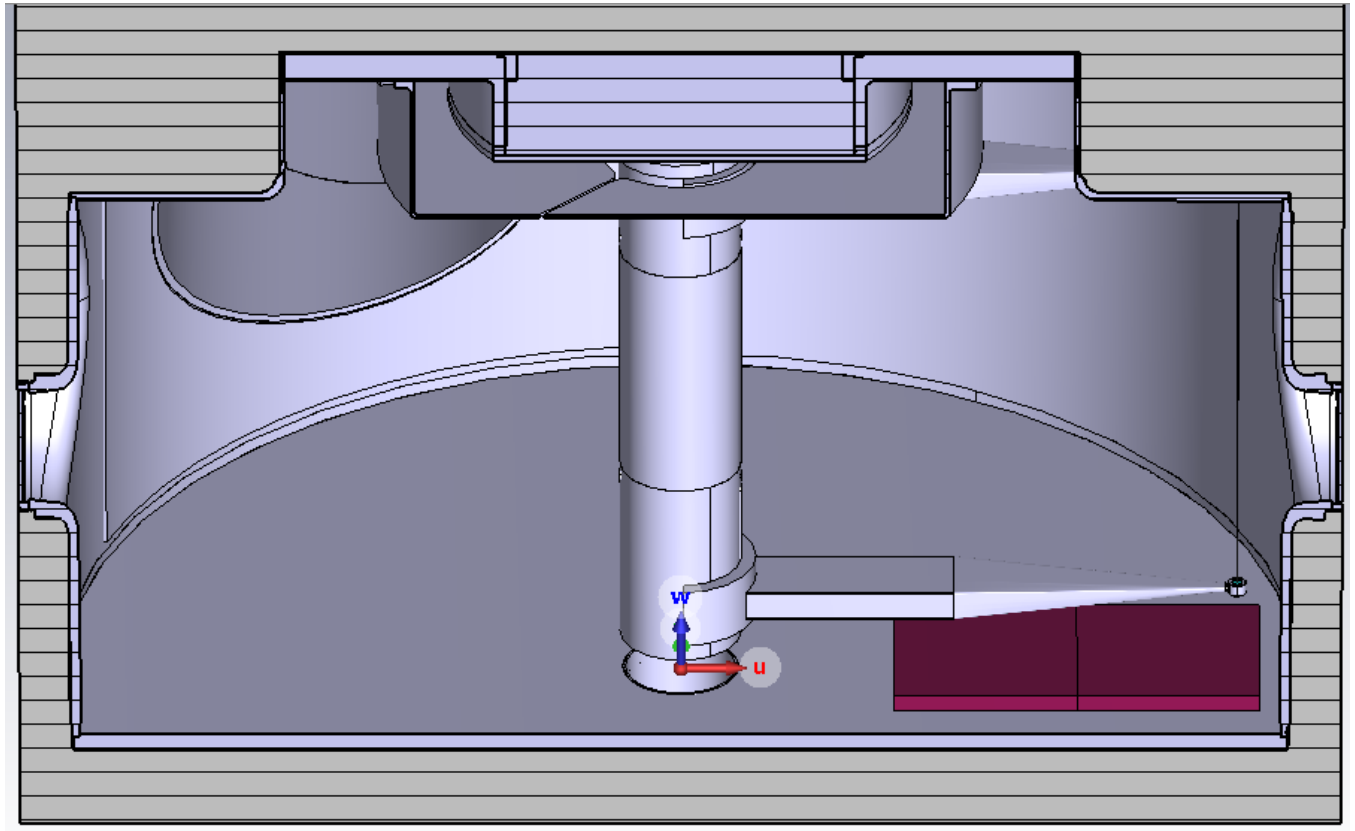


SPS Wire Scanner Task Force Impedance studies

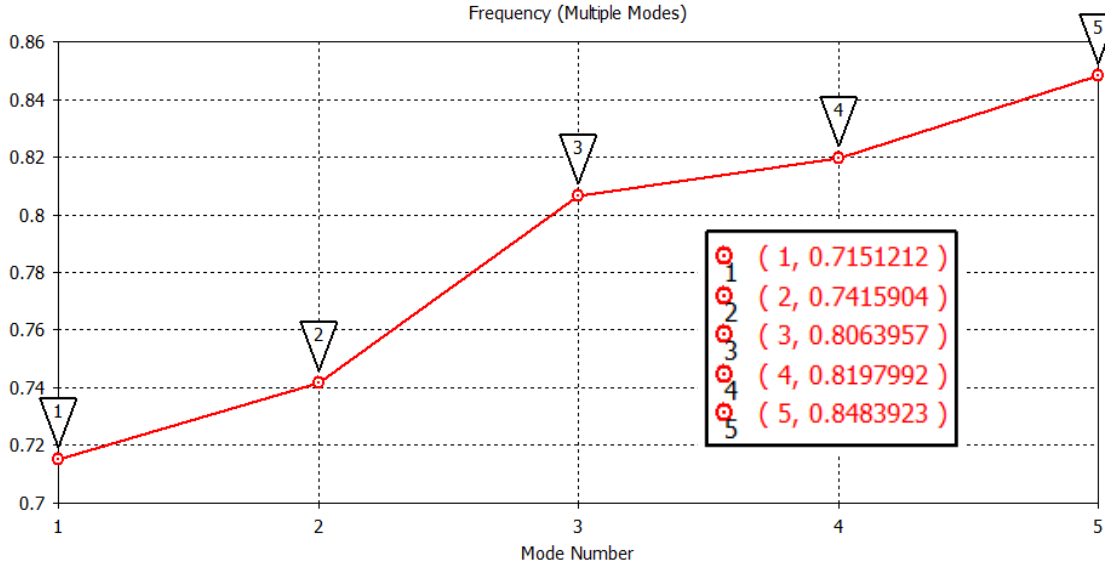
Michael Sullivan

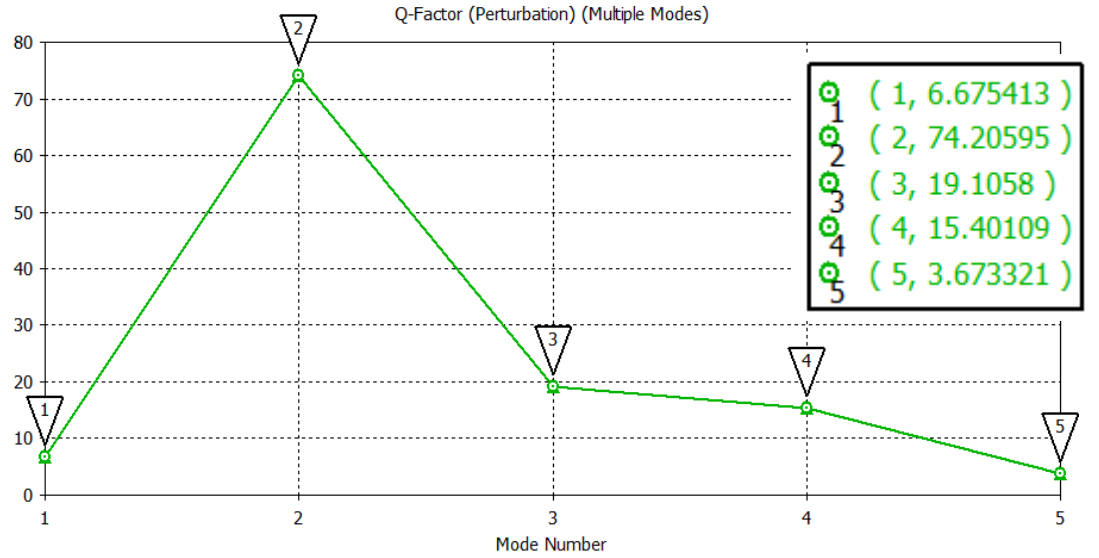
Mitigation option – TT2-111R Ferrite

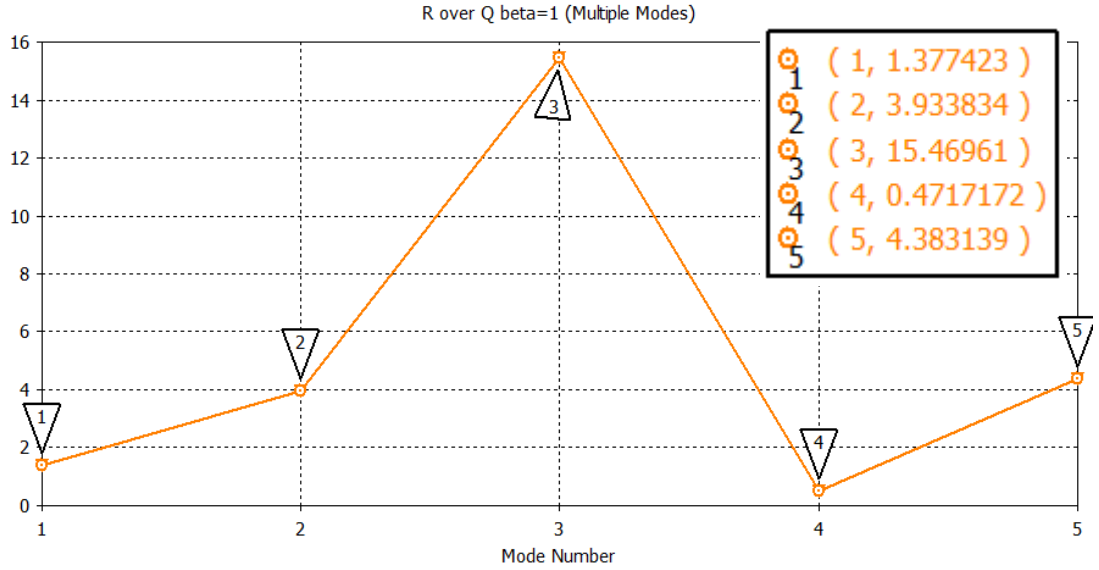


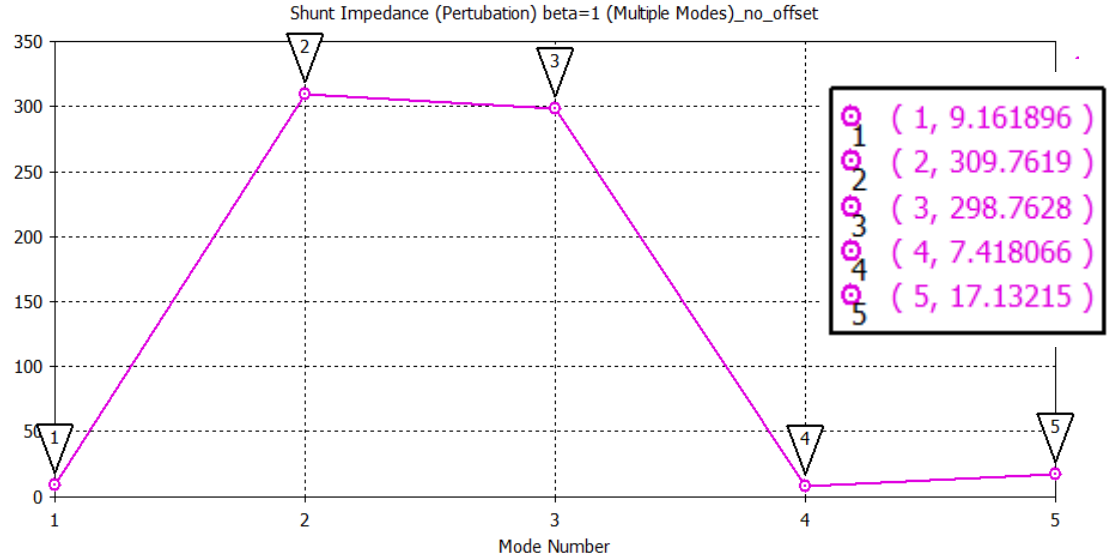


Mitigation option – TT2-111R Ferrite









Mitigation option – TT2-111R Ferrite

Mode	f [GHz]	Zsh [Ω]	Q	R/Q [Ω]	Disp on wire [%]
1	0.715	4.58	6.7	0.7	43.9
2	0.742	155	74	1.97	17.2
3	0.806	149	19	7.73	1.38
4	0.820	3.71	15	0.24	0.11
5	0.848	8.57	3.7	2.19	2.5

- For minimal heating we want:
  - Frequency not on beam spectrum harmonic
  - Lower shunt impedance (Zsh) – higher is ok if not near beam spectrum harmonic
  - Higher Q gives sharper peak – Lower Q gives broadband contribution
  - R/Q is a measure of the coupling between EM fields and beam
  - Disp on wire is the H-field losses on the carbon wire.

Summary

Setup	f [GHz]	Zsh [Ω]	Q	R/Q [Ω]	Disp on wire [%]
No feedthrough	0.807	10381	1233	8.32	34
No feedthrough – filled opening	0.807	10148	1180	8.50	36.5
Connected shaft	0.812	5118.3	1343	3.79	25.4
TT2-111R Ferrite	0.806	149	19	7.73	1.38

- Still to simulate/confirm results:
  - Isolated forks in Macor
  - Replace Macor by Vespel as isolated material.
  - Other arrangements of connecting the shaft to wall

Wire Scanner as in SPS

Impedance mitigation options (feedthrough excluded)