SPS flanges
Simulations & Measurements
Update

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Outline

- Introduction
- Impedance List Update
- Damping Resistors in Simulations
- Conclusions

Introduction

- We continue to search for possible causes of the suspected 1.4GHz microwave instability in the SPS.

- Last element of the list was simulated and impedance has been included in the table.

- Small study on the possibility of including the damping resistors in simulations has been carried out.

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Total Flange Impedance

Flange Type	Enamel	Bellow	Num. of elements	Freq. [GHz]	Impedance	Q	R/Q [Ω]	Resistor
BPV-QD	Yes	Yes	90	1.21	633kΩ	315	2010	No
BPH-QF	Yes	Yes	39	1.28	1.03MΩ	400	2496	Long
QF-MBA	Yes	Yes	83	1.41	1.6MΩ	268	5985	Short
MBA-MBA	Yes	Yes	14	1.41	297kΩ	285	1040	Short
QF-QF	No	Yes	26	1.41	3.767MΩ	1828	2061	Short
QD-QD	Yes	No	99	1.57	17kΩ	55	317	No
QF-QF	No	No	20	1.61	588kΩ	980	600	No
BPH-QF	Yes	Yes	39	1.62	121kΩ	120	1014	Long
QD-QD	No	No	75	1.8	651kΩ	881	739	No
QD-QD	Yes	No	99	1.89	186kΩ	175	1070	No

No damping resistors included in simulations.

The ‘Resistor’ column states whether or not each element should have a resistor.

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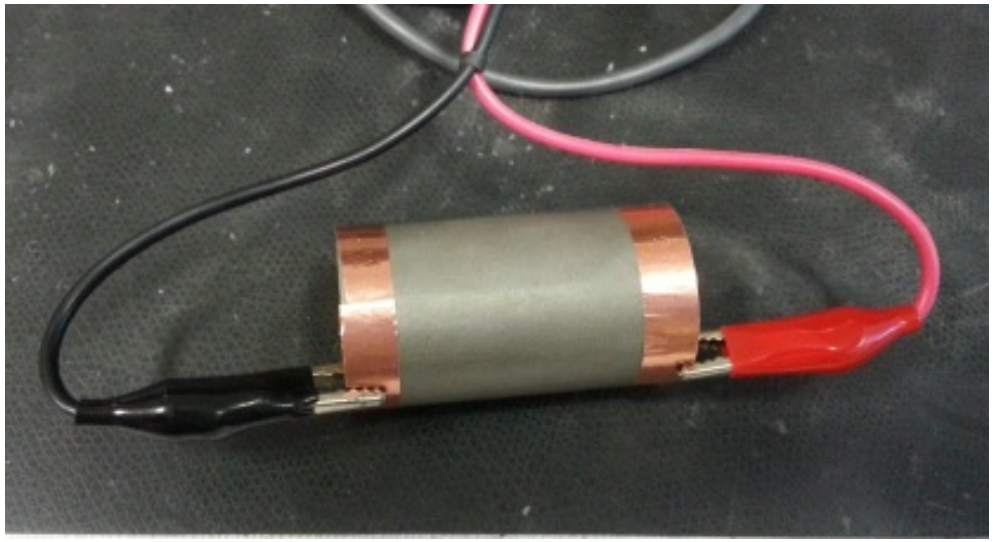
Damping Resistor DC Measurement

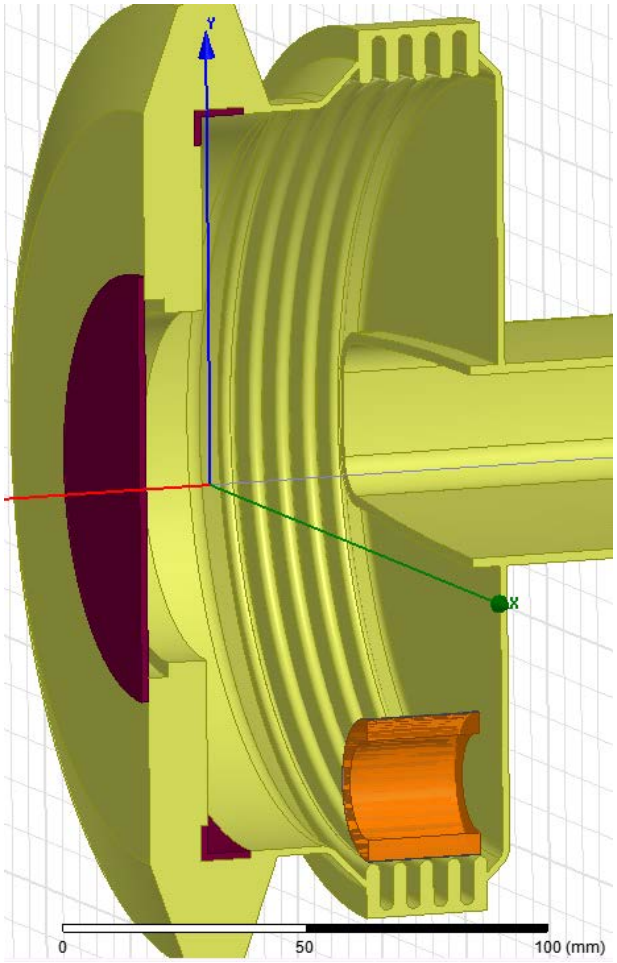
A 4-wire DC measurement was taken on a long damping resistor as shown in the Figure.

The measured resistance was 160Ω.

A conductivity value of 15.7 S/m for the Nickel-Chrome layer was deduced from the measured value.

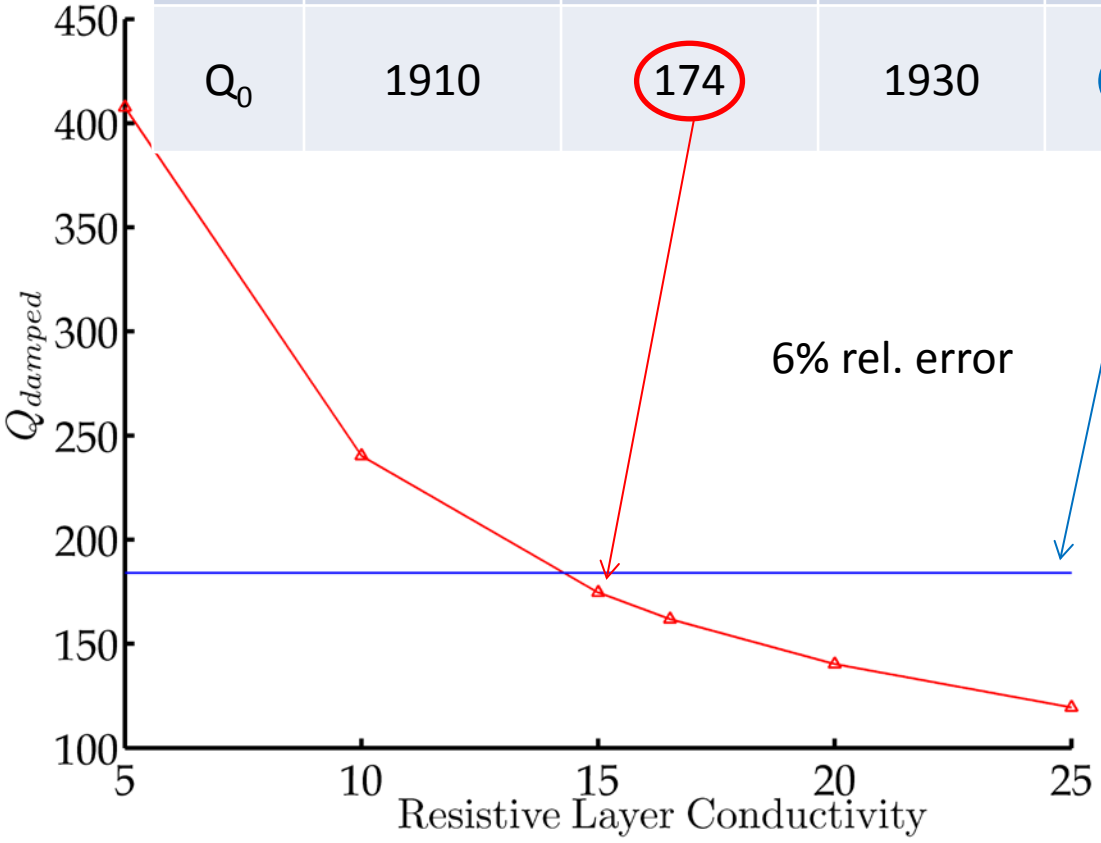


Damping Resistor in Simulations



The volume of the resistor represents around 1.5% of the total cavity volume.

	Simulation no Resistor	Simulation with Resistor	Meas. no Resistor	Meas. with Resistor
f [GHz]	1.423	1.414 (-0.68%)	1.417	1.411 (-0.42%)
Q_0	1910	174	1930	186



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Conclusions

- All the elements in the original flange list have been analysed.
- The impedance, Q and R/Q values have been provided for the bigger resonances.
- A ‘calibration’ of the conductivity value to be used in simulations for the Nickel-Chrome has been carried out.