SPS IMPEDANCE BUDGET

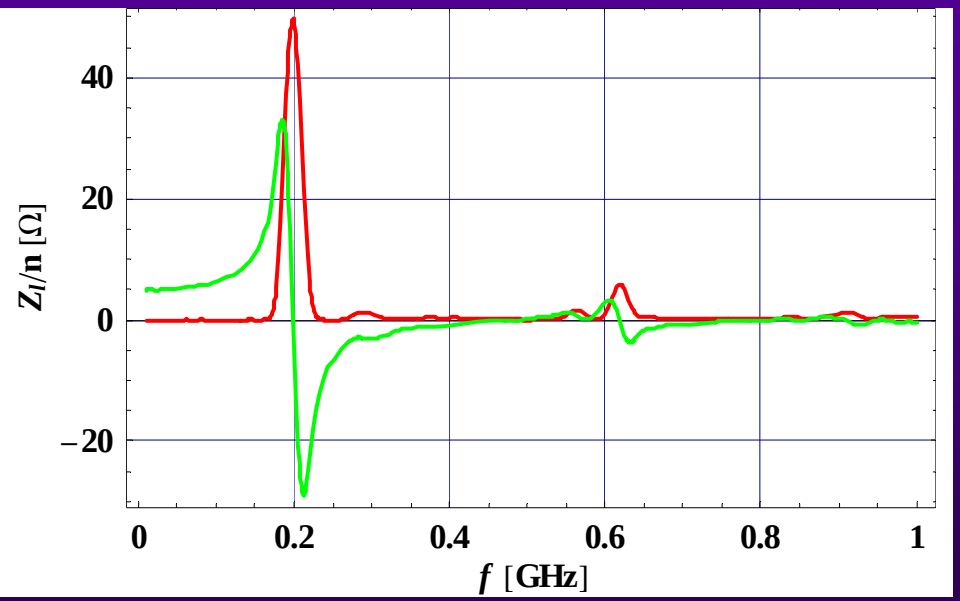
E. Métral

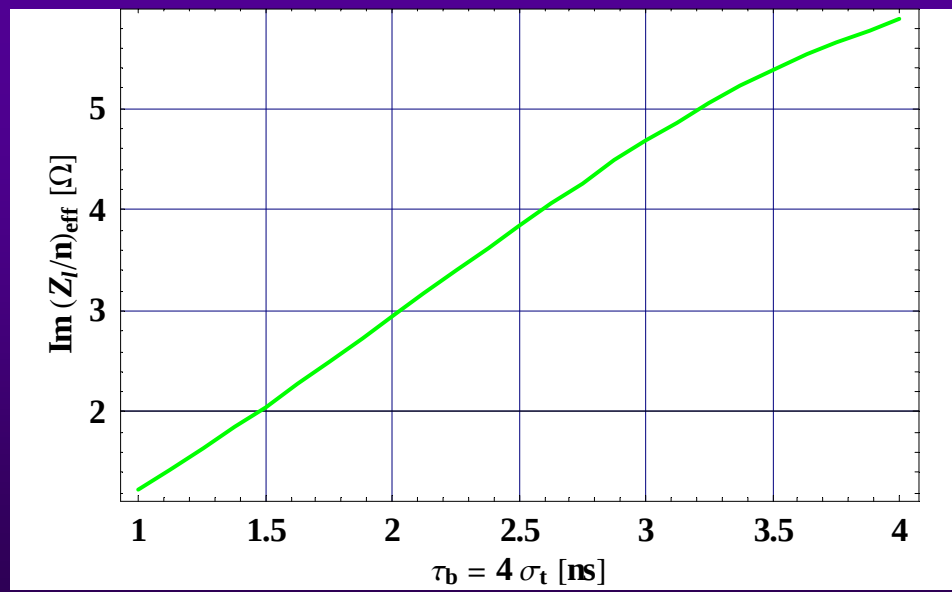
- **Longitudinal plane**
  - **Reasonably well understood? Resonance at 1.4 GHz**
  - **Measurements very sensitive to both bunch length and longitudinal emittance**
- **Vertical plane**
  - **~ ½ of the vertical impedance is missing $\Longrightarrow$ 13 MΩ/m for the coherent tune shift**
  - **Measurements not very sensitive to both bunch length and longitudinal emittance**

Longitudinal plane (1/2)

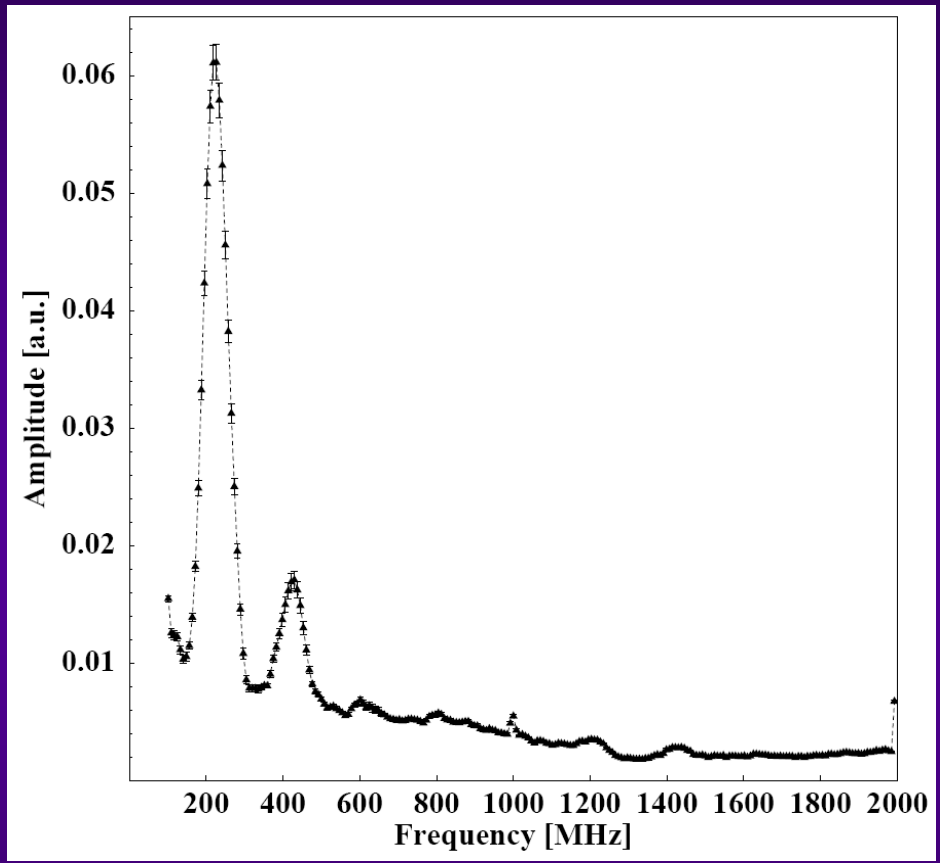
$Im(Z_l/n)_{eff}$ [Ω]	Meas	delta	Theory (kickers)	delta	Error delta [%]
2001	4.4		1.2		
2003	6.2	1.8	3.4	2.2	-18
2006	7.4	1.2	5.2	1.8	-33
2007	10.2	2.8	4.4	-0.8	-450

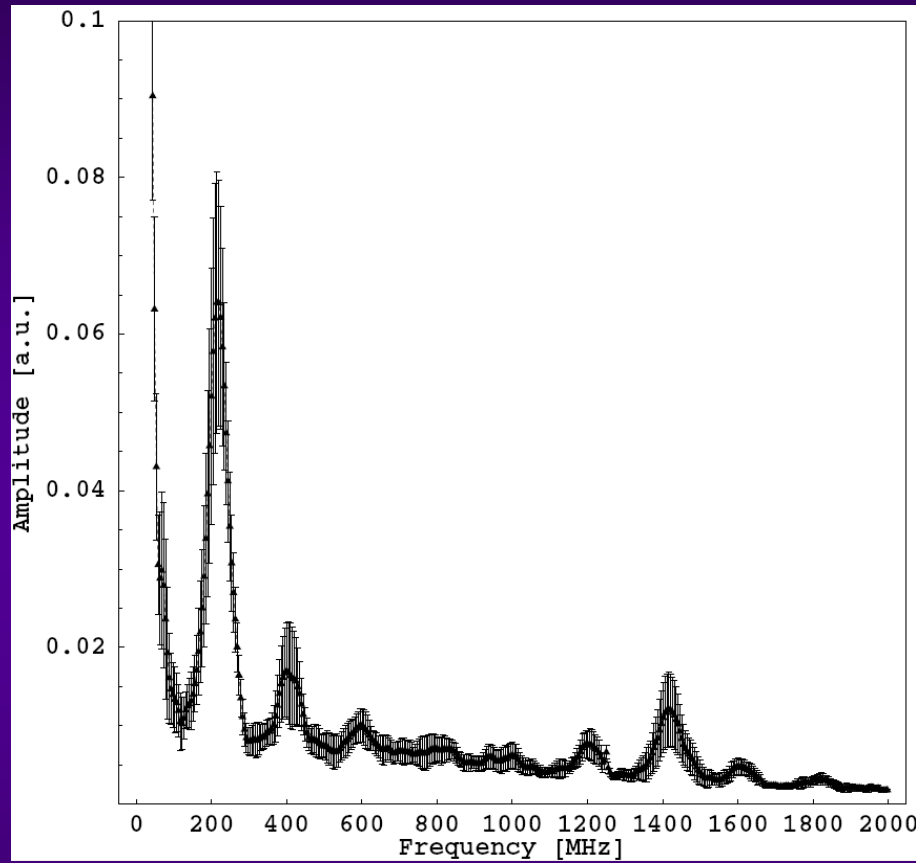
Four TW 200 MHz RF cavities





Longitudinal plane (2/2)





Unstable bunch spectrum with RF OFF in 2001

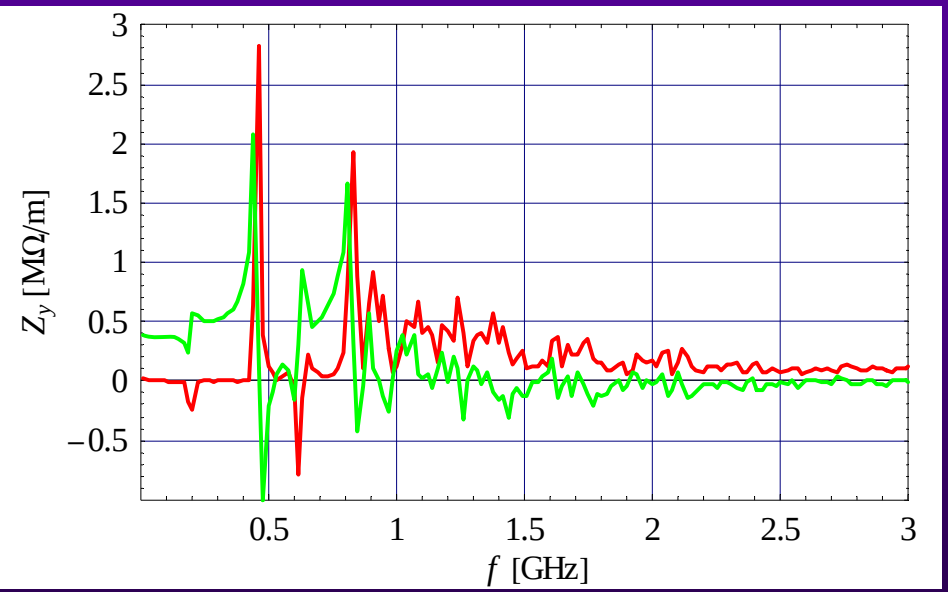
Unstable bunch spectrum with RF OFF in 2007

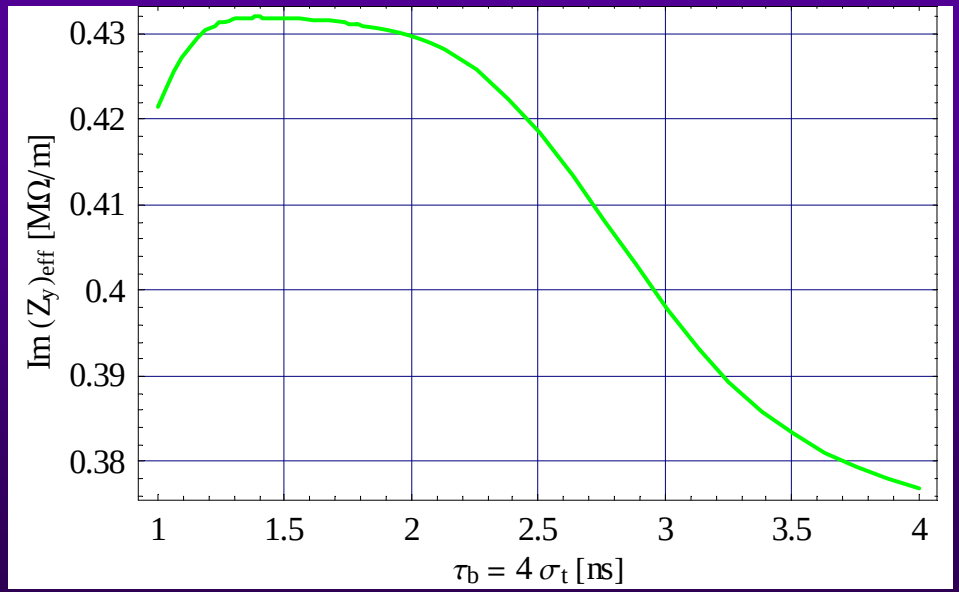
Vertical plane (1/4)

$Im(Z_y)_{eff}$ [MΩ/m]	Meas	delta	Theory (kickers)	delta	Error delta [%]
2001	19.1		3.5		
2003	22.2	3.1	6.4	2.9	7
2006	23.6	1.4	8.7	2.3	-39
2007	22	-1.6			

Space charge $\Longrightarrow$ $Im(Z_y)_{eff}$ = 2.6 MΩ/m

Four TW 200 MHz RF cavities (new result from B. Spataro)





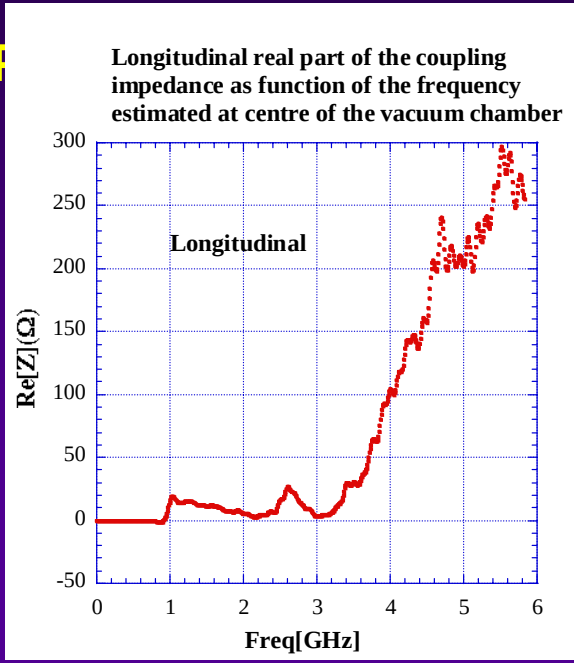
Vertical plane (2/4)

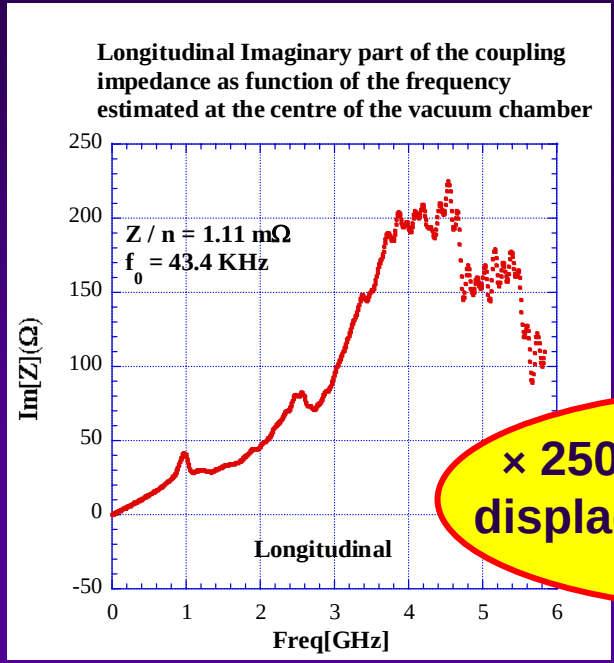
- **Other equipments simulated or computed (small contribution)**
  - **BPMs**
  - **Vacuum pumping ports**
  - **TIDVG**
  - **IPM $\Longrightarrow$ New result from B. Spataro**

- **Next steps**
  - **BWS**
  - **Examine in detail the remaining kickers and septa which do not have shielded transitions**
  - **…**

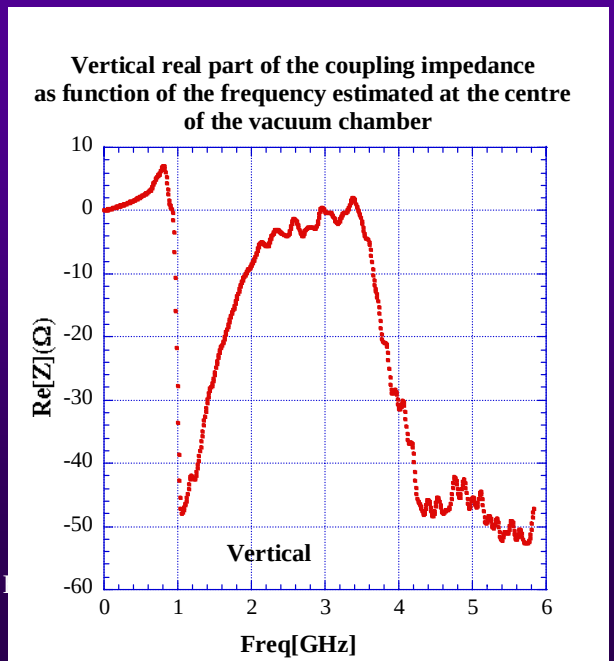
Vertical plane (3/4)

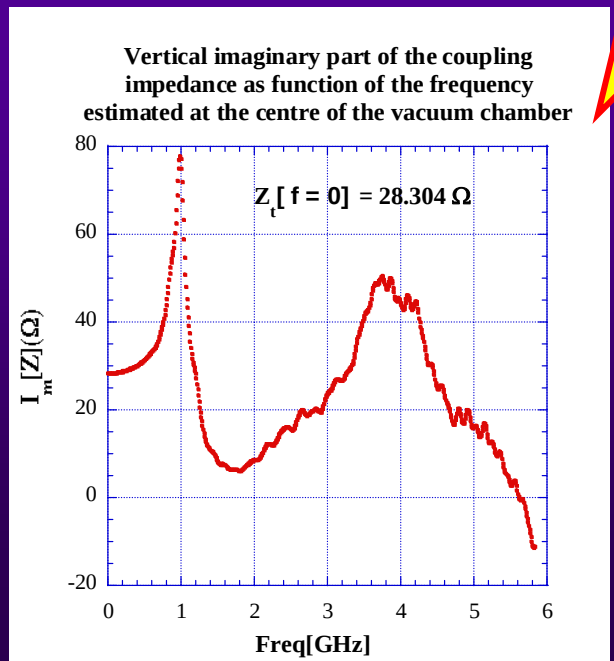
- IP





× 250 to have Ω/m (4 mm displacement) ⟹ 7.1 kΩ/m





Vertical plane (4/4)

- **Tank gap and intermodule screening ⟹ To be treated…**

Magnet	Location	H aperture	V aperture	Tank gap screening	Intermodule screening
MKP-S I, 5 module	LSS1 MKP-S 11931	100	61	yes	yes
MKP-S II, 5 module	LSS1 MKP-S 11936	100	61	yes	yes
MKP-S III, 2 module	LSS1 MKP-S 11952	100	61	yes	yes
MKP-L IV, 4 module	LSS1 MKP-L 11955	140	54	no	no
spare MKP-S I, 5 module	storage	100	61	yes	yes
spare MKP-S III, 2 module	storage	100	61	yes	yes
spare MKP-L IV, 4 module	(under reconstruction)	140	54	under project	under project
MKQH	LSS1 MKQH 11653	135 *	33.9	No	not applicable
MKQV	LSS1 MKQV 11679	102	56	No	not applicable
MKDH-1	LSS1 MKDH-1 11751	56	97.1	No	not applicable
MKDH-2	LSS1 MKDH-2 11754	56	97.1	No	not applicable
MKDH-3	LSS1 MKDH-3 11756	60	106.1	No	not applicable
MKDV-1	LSS1 MKDV-1 11731	75	56	No	not applicable
MKDV-2	LSS1 MKDV-2 11735	83	56	No	not applicable
spare MKDV-2	AB-BT lab	83	56	No	not applicable
MKE-L2	LSS4 MKE-L 41631	147.7	35	yes	not applicable
MKE-L5	LSS4 MKE-L 41634	147.7	35	yes	not applicable
MKE-S4	LSS4 MKE-S 41637	135	32	yes	not applicable
MKE-S7	LSS4 MKE-S 41651	135	32	yes	not applicable
MKE-L1	LSS4 MKE-L 41654	147.7	35	yes	not applicable
MKE-L10	LSS6 MKE-L 61631	147.7	35	yes	not applicable
MKE-L9	LSS6 MKE-L 61634	147.7	35	yes	not applicable
MKE-S6	LSS6 MKE-S 61637	135	32	yes	not applicable
spare MKE-L8	storage	147.7	35	yes	not applicable
spare MKE-S3	storage	135	32	yes	not applicable