

HOM's of 200 MHz RF-cavities – Resonator Impedance

T. Linnecar et al., **CERN SL-Note-2001-044-HRF**. Damped and undamped longitudinal modes. Only **undamped dipole modes** (for these *no table*, plot only; data in D. Angal's paper **LHC Project-Report 595**). *Damped dipole mode data missing altogether.*

Contacted J. Tuckmantel: **LHC-Project-Report 368**. J.T. calculated the f and R/Q values for this cavity, monopole numbers are given there; for dipoles (up to decapoles) he has the **longitudinal R/Q at the edge of the beam tube (?)**, but not published. The Q-values (and shunt imp.) are for the bare cavity without HOM dampers, they are upper limit.

JT cautions that Report 2001-044-HRF was done by Chinese visitor assuming a certain geometry of the HOM coupling loop. He is 'reluctant to take these numbers as rock-solid basis.'

HOM's of 400 MHz RF-cavities – Resonator Impedance

E. Haebel et al., **CERN-SL-98-008-RF**. *Damped and undamped longitudinal and dipole modes. Only Q values given in table, no R_{sh} or R/Q? Data in D. Angal's paper LHC Project-Report 595. Complete? Are we concerned with the difference between TM & TE modes?*

Contacted J. Tuckmantel: all monopoles propagate through the large beam tube, hence a module with 4 single cell cavities is for the HOMs a 4-cell supercavity. Due to fabrication tolerances the individual cavity HOM frequencies have a non-negligible scatter. Worst case is that one mode is synchronous over the full module and thus appears equal to 4 times a single cavity with dampers. **The R/Q of the fundamental mode is 45 Ohm. If Joachim remembers right, the Q of the worst HOM should be about 1/3 of that.** 'Unfortunately the main actors of the LHC cavity design are retired or back to their labs elsewhere.'

Modes of Transverse Damper – Resonator Impedance

D. Angal-Kalinin et al., **LHC Project-Report 595** (source W.H.). *Dipole mode data missing. Relevant?* Contacted W. Hofle. No response so far.

Trapped modes in experimental chambers – Resonator Impedance

D. Angal-Kalinin et al., **LHC Project-Report 595** (source *MAFIA calculation by Yun.Luo, unpublished*). Only 1/2 of CMS. Monopole modes only. *Dipole modes? Other experimental regions? Why 1/2 chamber? MAFIA source?*

Recombination Chamber – Resonator Impedance

D. Brandt et al., **LHC Project Report 604**, calculation and experiments on trapped modes.

Kickers Dump & Injection Kickers - Narrow-band and broad-band

G. Lambertson, Calculation of the LHC Kicker Impedance, **PAC99**, analytical calculation for combined contribution of ceramic, metallic stripes and kicker magnet. Longitudinal and transverse impedance for the [injection kickers](#). *Similar calculation for dump kicker?*

Impedance of coated ceramic:

D. Brandt et al., Penetration of Electro-Magnetic Fields through a Thin Resistive Layer, **AB-Note-2003-002 MD** (2003), measurements with coating and second shield; the latter has a big impact!

D. Brandt et al., **EPAC 2000 Vienna**, results without second shield.

F. Caspers et al., Bench Measurements of Low Frequency Transverse Impedance, **CERN-AB-2003-051-RF**, describes novel measurement procedure.

BPM's – Narrow-band and broad-band

L. Vos and A. Wagner, **LHC Project Report 126 (1997)**. Longitudinal Impedance. Transverse impedance using formula from Luc, February 26? *Complete!*

Cold-warm transitions – Narrow-band and broad-band

Contacted L. Vos: Vacuum chamber made of stainless + a very thin layer of copper (a few microns) that Luc proposed to compromise between heat conduction and power deposition. **Ref. LHC-VST-ES-0001 rev. 1.0**. 100 units. 5 micron Cu coating on 1-mm thick SS. Length about 0.3 m. Inner diameter ~63 mm. Impedance calculation by Luc. Inductive bypass important. Geometric impedance sources: shape transition taper angle <10 degree, rf junctions?

Quadrupolar impedance – for Collimators (later electron cloud?)

G. Stupakov, Impedance of Small Angle Collimators in High Frequency Limit, **SLAC-PUB-8857** (2001). Kaoru Yokoya, Resistive Wall Impedance of Beam Pipes of General Cross Section. **Part.Accel.41:221-248**,1993