Discussion on HOM dampers

R. Hajima

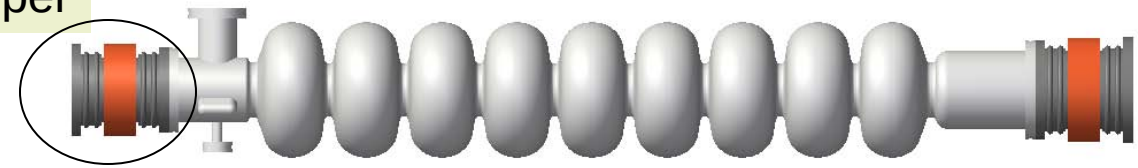
Japan Atomic Energy Agency

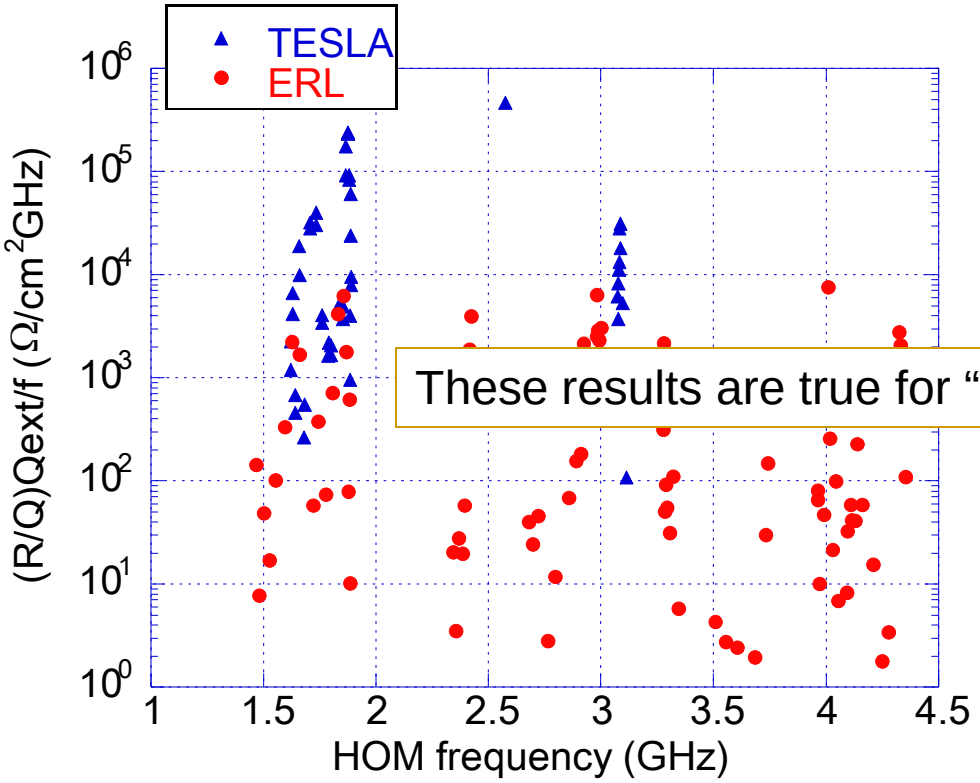
March 4, 2009

Needs of HOM dampers

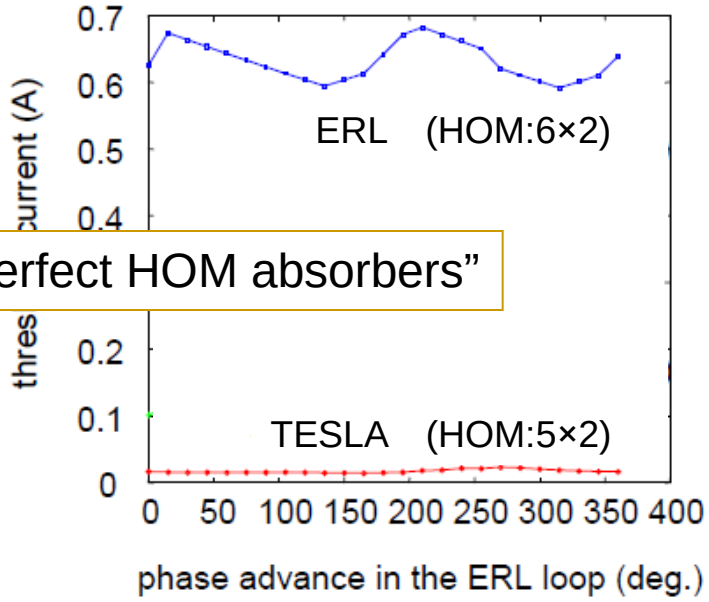
ERL Cavity developed by KEK/JAEA/U-Tokyo

HOM damper

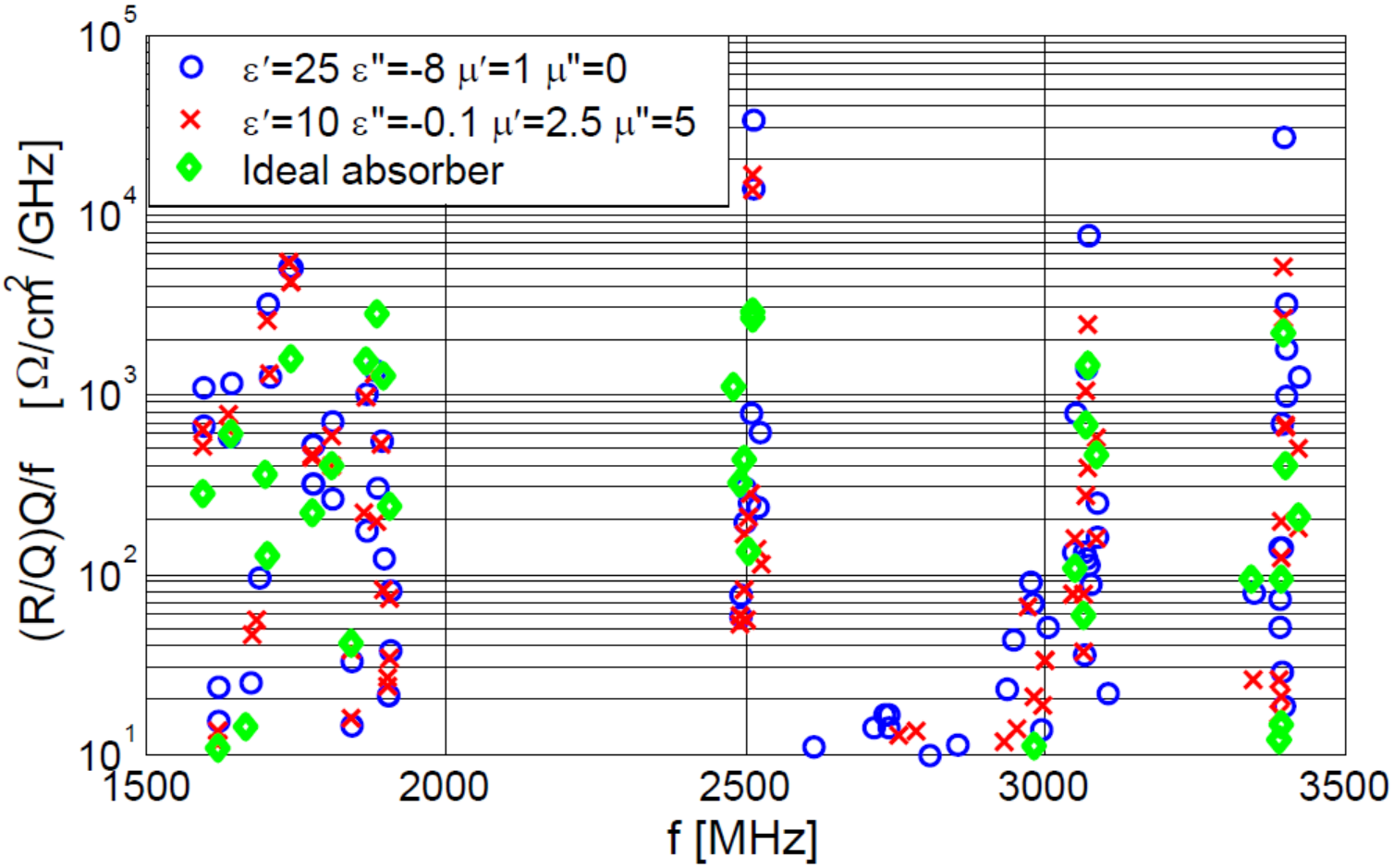




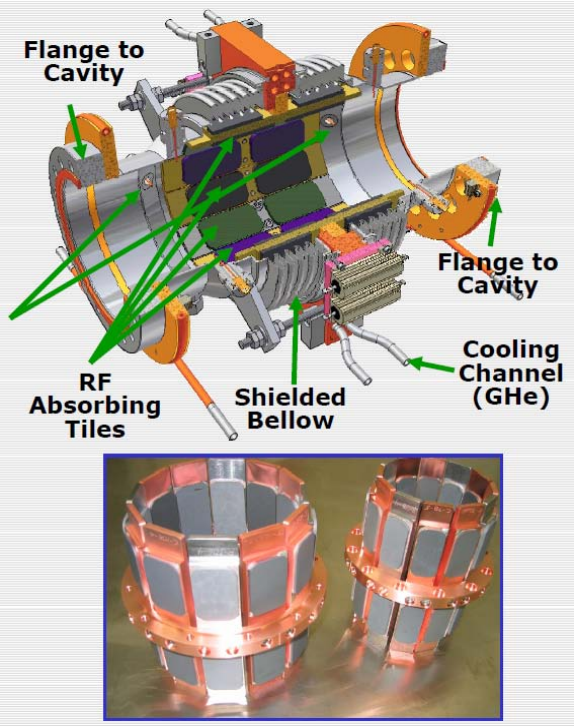
These results are true for “perfect HOM absorbers”



Ideal RF HOM Beampipe Absorber vs. Real Absorber



HOM damper at Cornell ERL



Total # loads	3 @ 78mm + 3 @ 106mm
Power per load	26 W (200 W max)
HOM frequency range	1.4 – 100 GHz
Operating temperature	80 K
Coolant	He Gas
RF absorbing tiles	TT2, Co2Z, Ceralloy

bonding = brazing

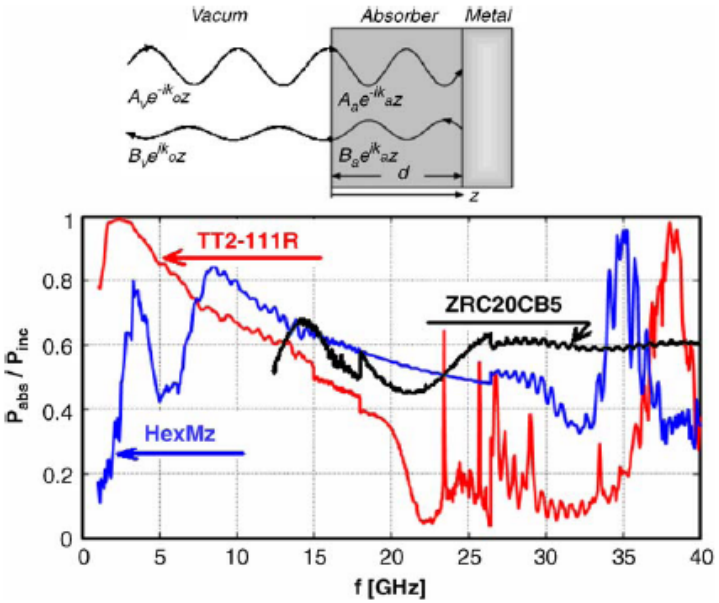


Fig. 4. Absorber model calculation ($d = 3$ mm) based on measured ε and μ at 80 K.

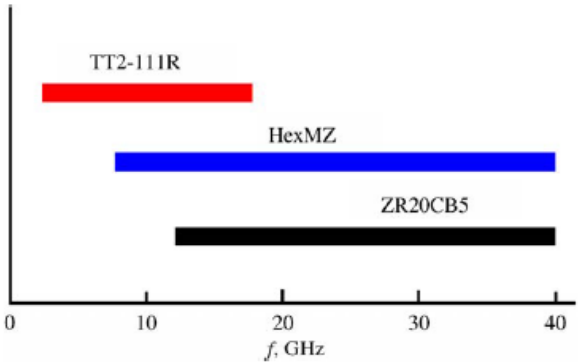
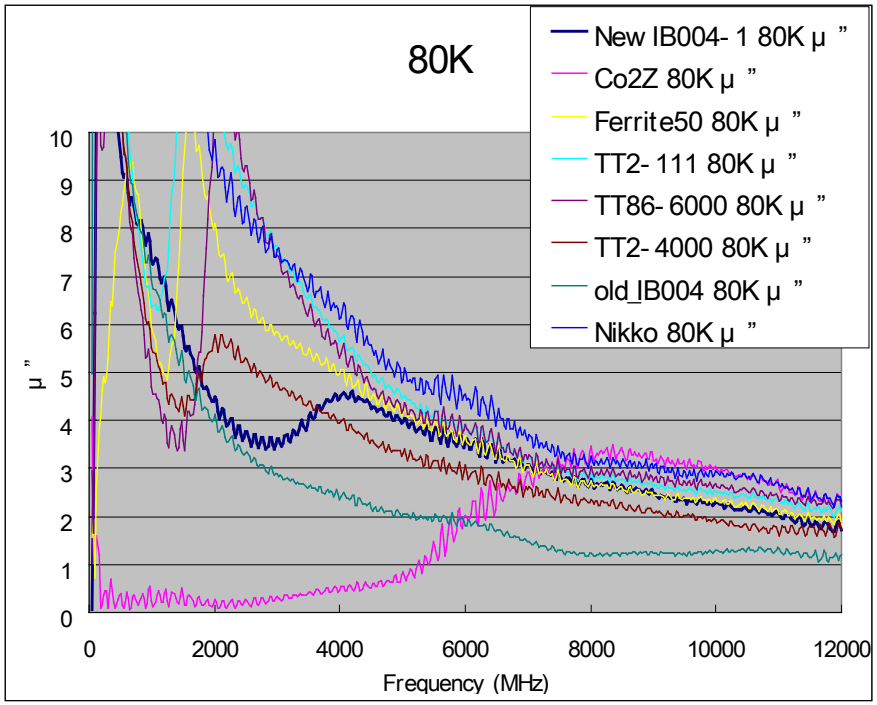
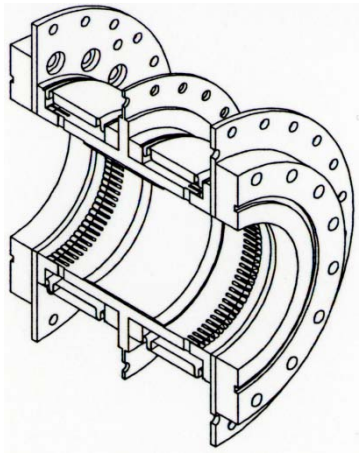
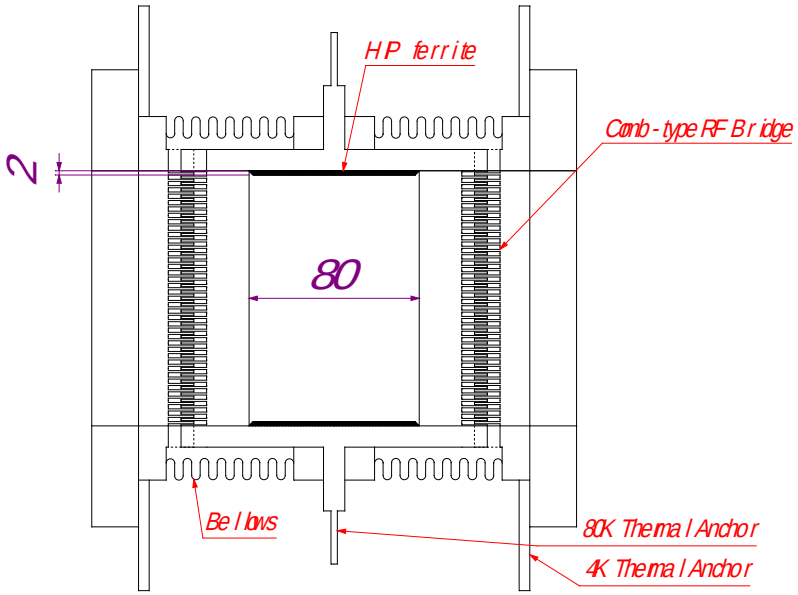


Fig. 5. Regions of application for three chosen materials.

HOM damper at KEK/JAEA ERL







"New IB004-1" was selected.
bonding = hot isostatic press (HIP)

Discussion Items

- Coax or off-axis couplers
  - Notch filters for couplers
  - Waveguide heating is no problem for 100mA
- Material
  - Temparature
  - Carbon nanotube for Cornell main linac
- frequency range to be covered
  - XFEL has HOM absorber at the end of module
  - We need to manage high-frequency component
- Manufacturing
  - Study needed
  - Thermal cycle? Design to avoid cracking
  - HIP seems promising
- Magnetization
  - No problem, so far.
- conductivity (charging up)
  - Carbon nanotube seems to be conductive in low temp.