FOLLOW-UP OF THE GSI WORKSHOP HELD ON 30-31/03/06

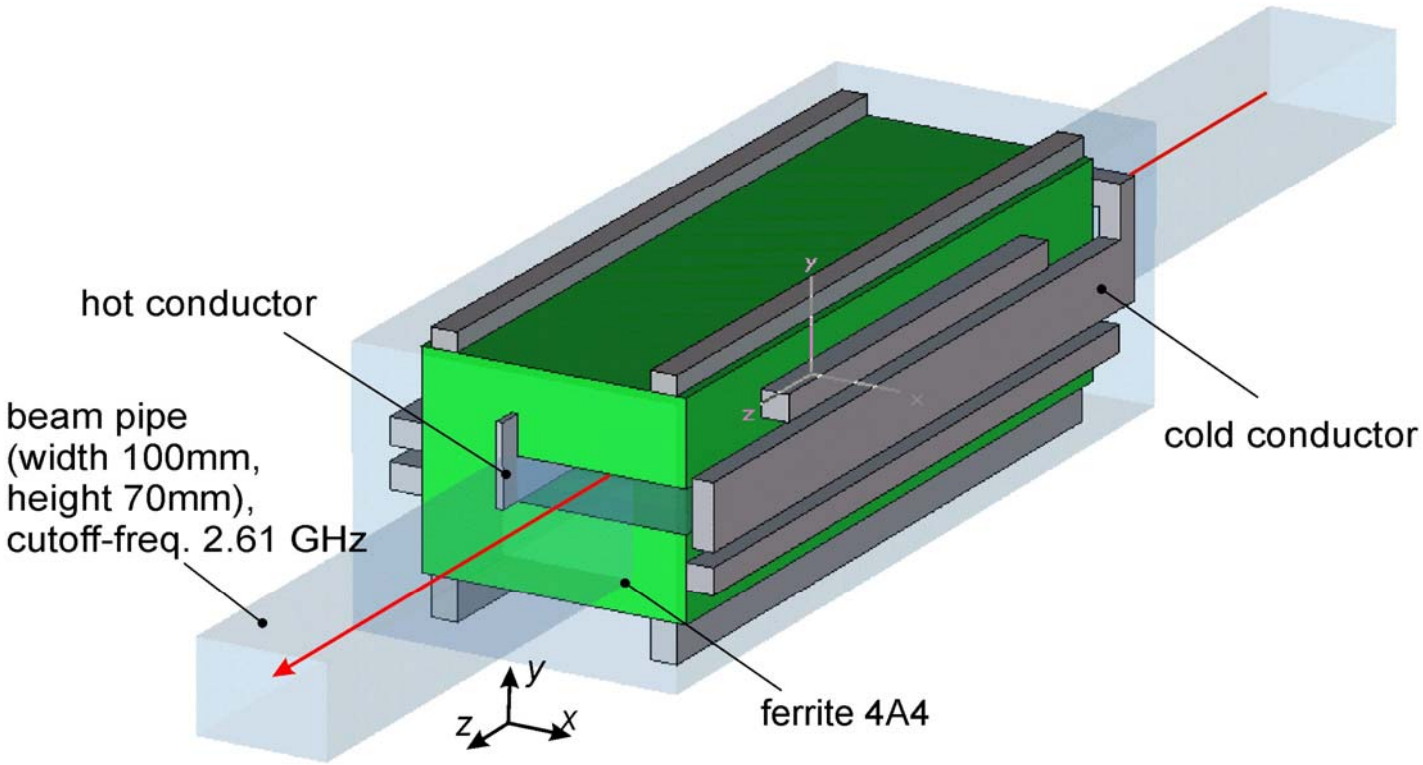
Elias Métral

- **Burkhardt Doliwa (TU Darmstadt)**
  - ⇒ **Simulation for the SPS MKE kicker**
- **Rainer Hasse (GSI)**
  - ⇒ **Numerical estimate for a LHC collimator**

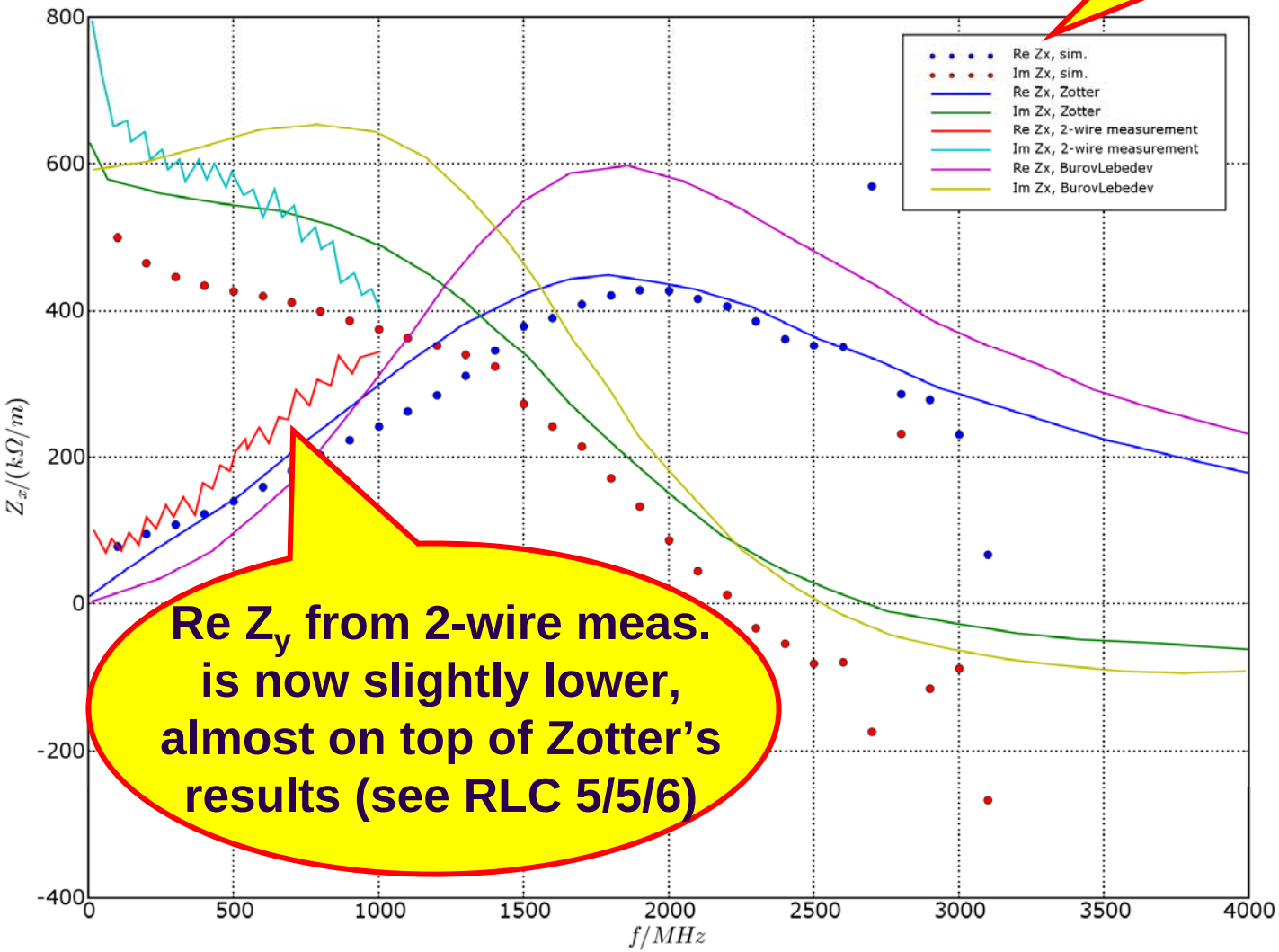
PRELIMINARY RESULTS ⇒ They are still checking them

BURKHARDT DOLIWA (1/2)

Length simulated = 1/3 of the original



BURKHARDT DOLIWA (2/2)

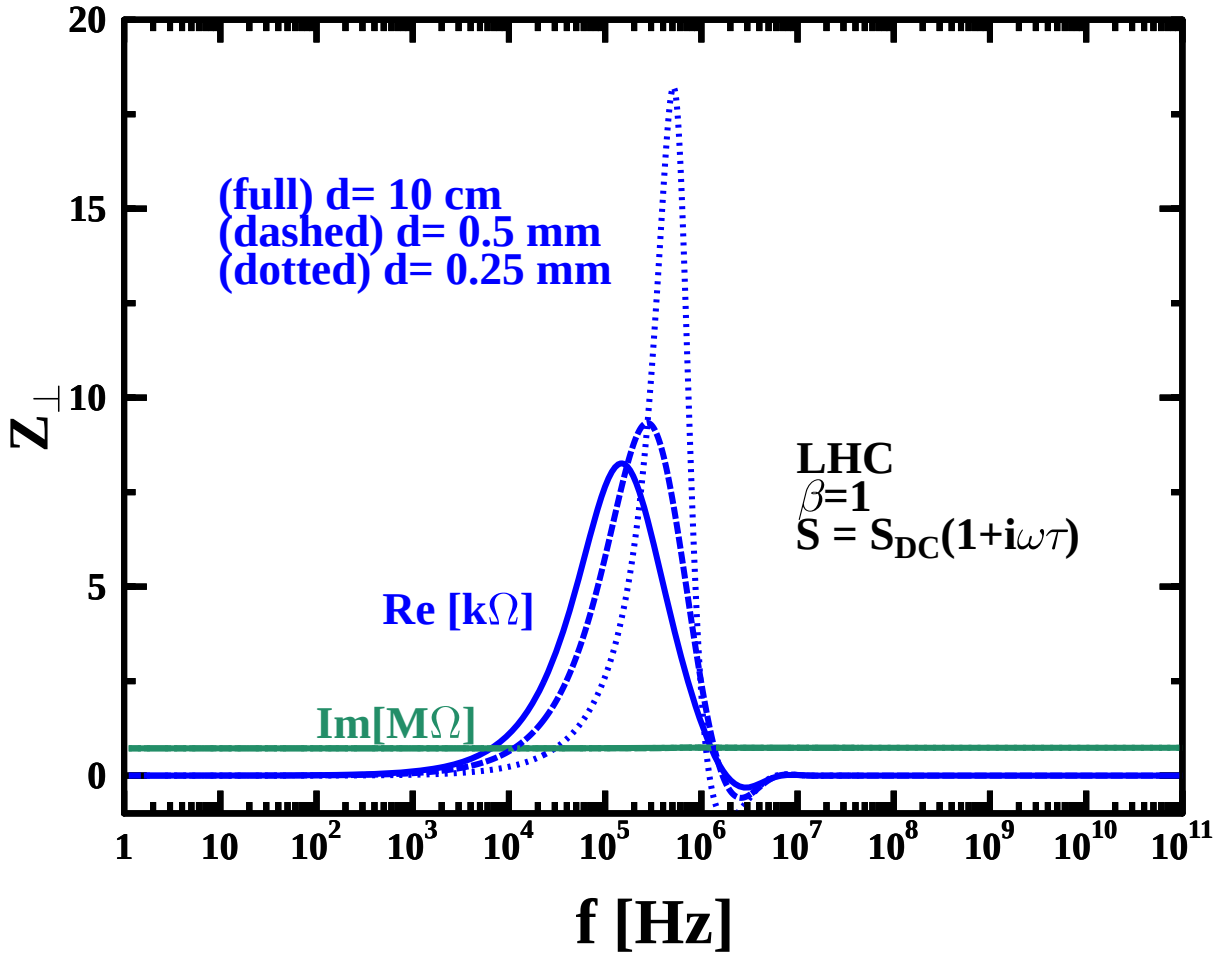


Z_x should be Z_y

Re Z_y from 2-wire meas. is now slightly lower, almost on top of Zotter's results (see RLC 5/5/6)

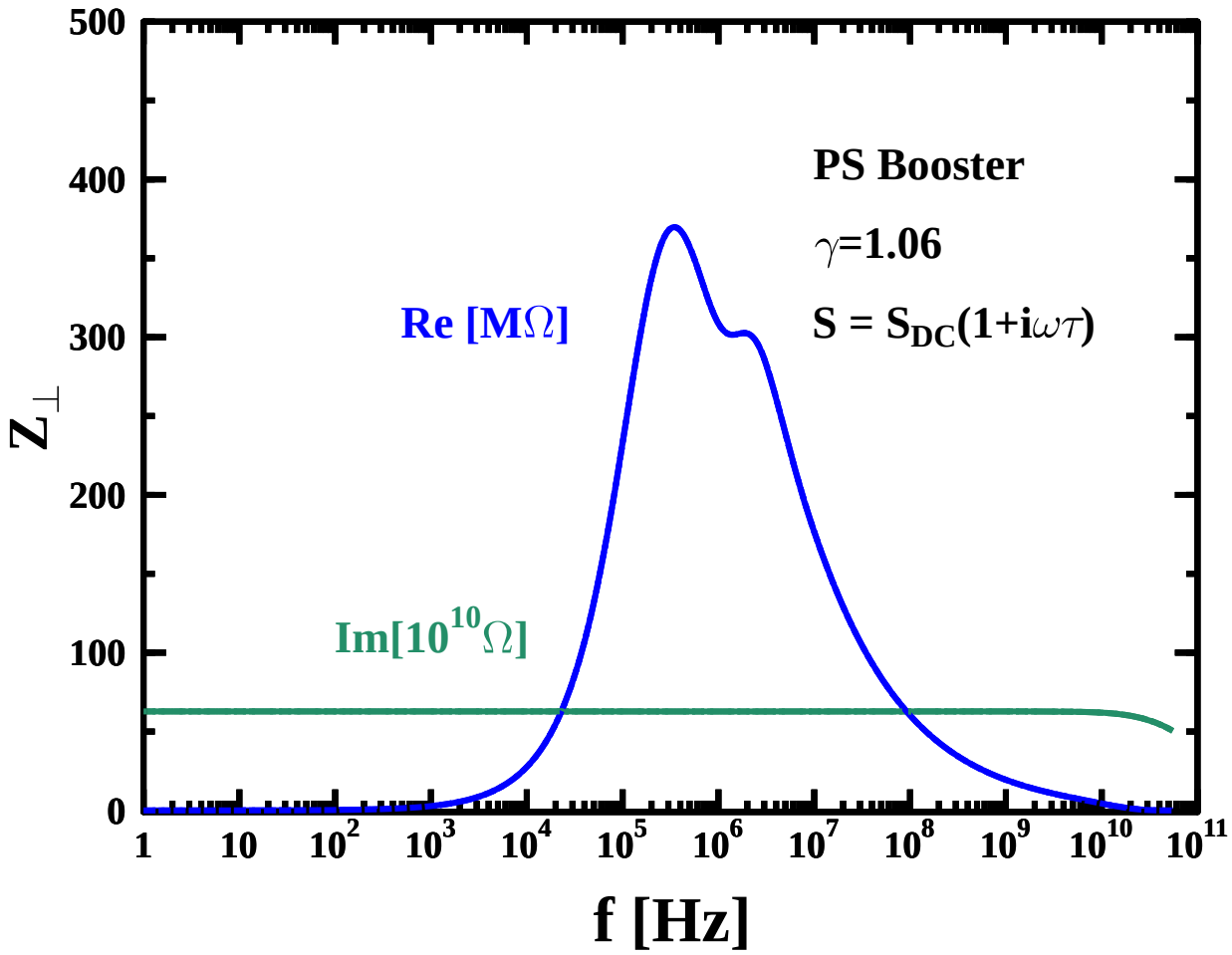
RAINER HASSE (1/6)

With SC

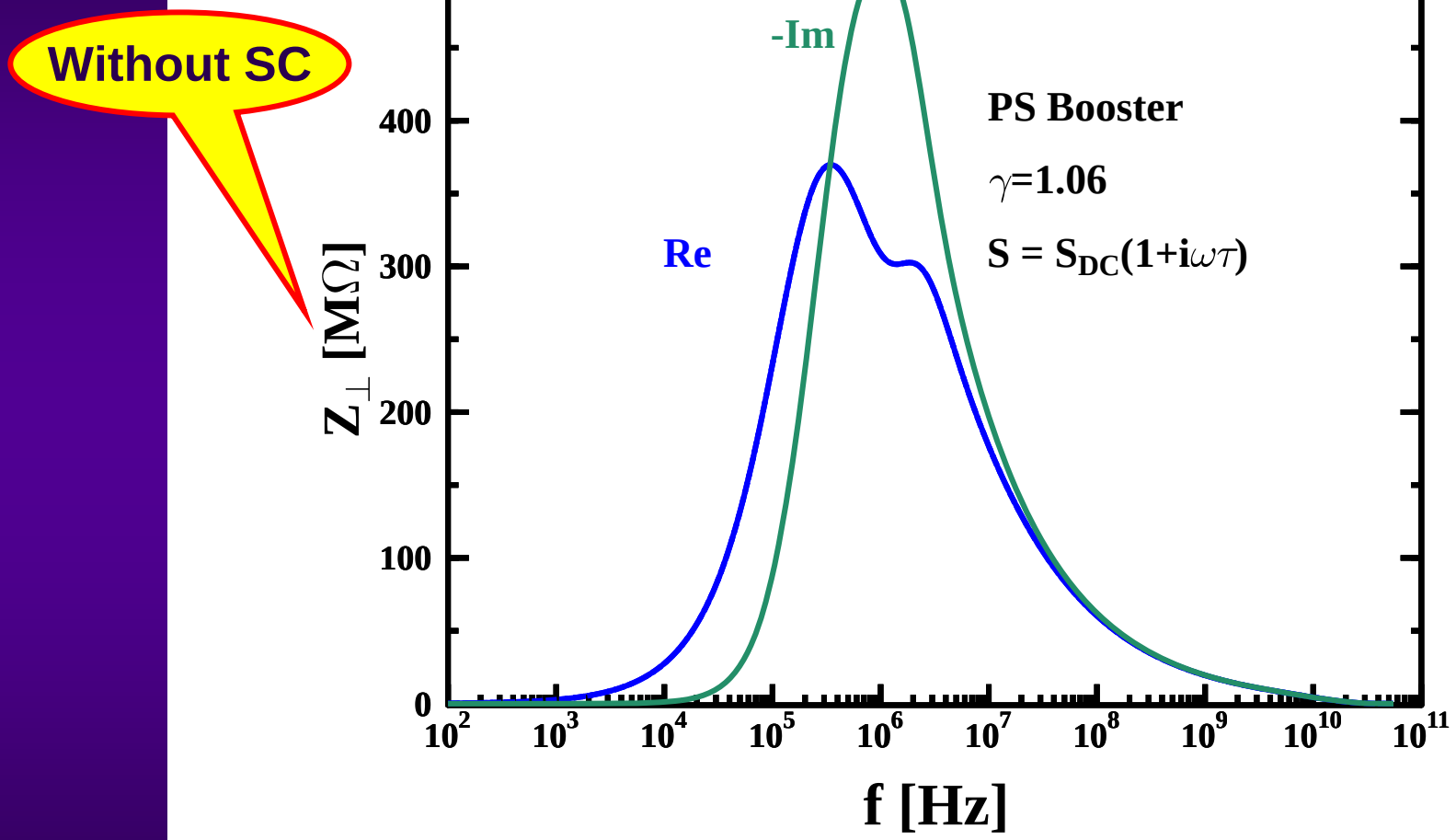


RAINER HASSE (2/6)

With SC

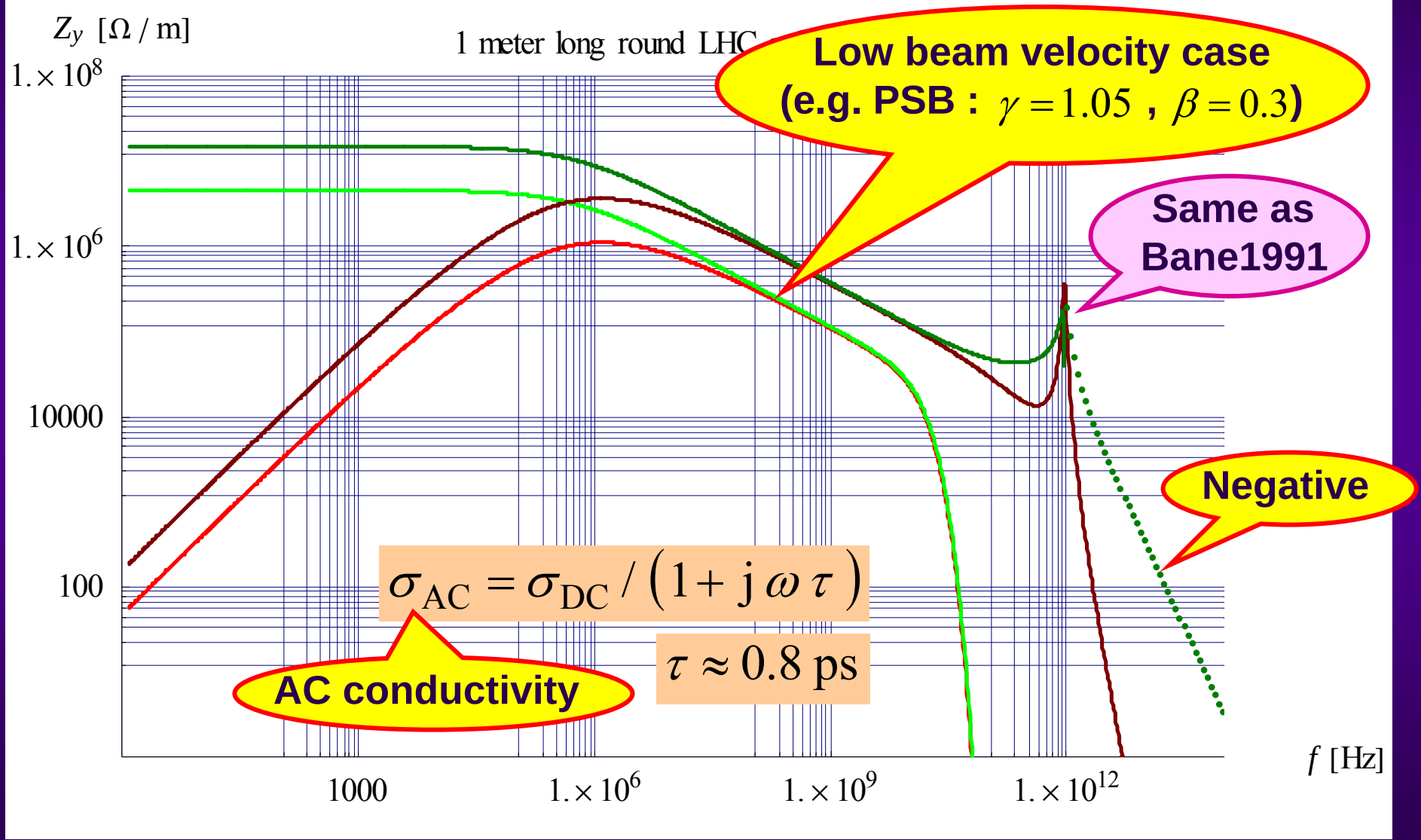


RAINER HASSE (3/6)

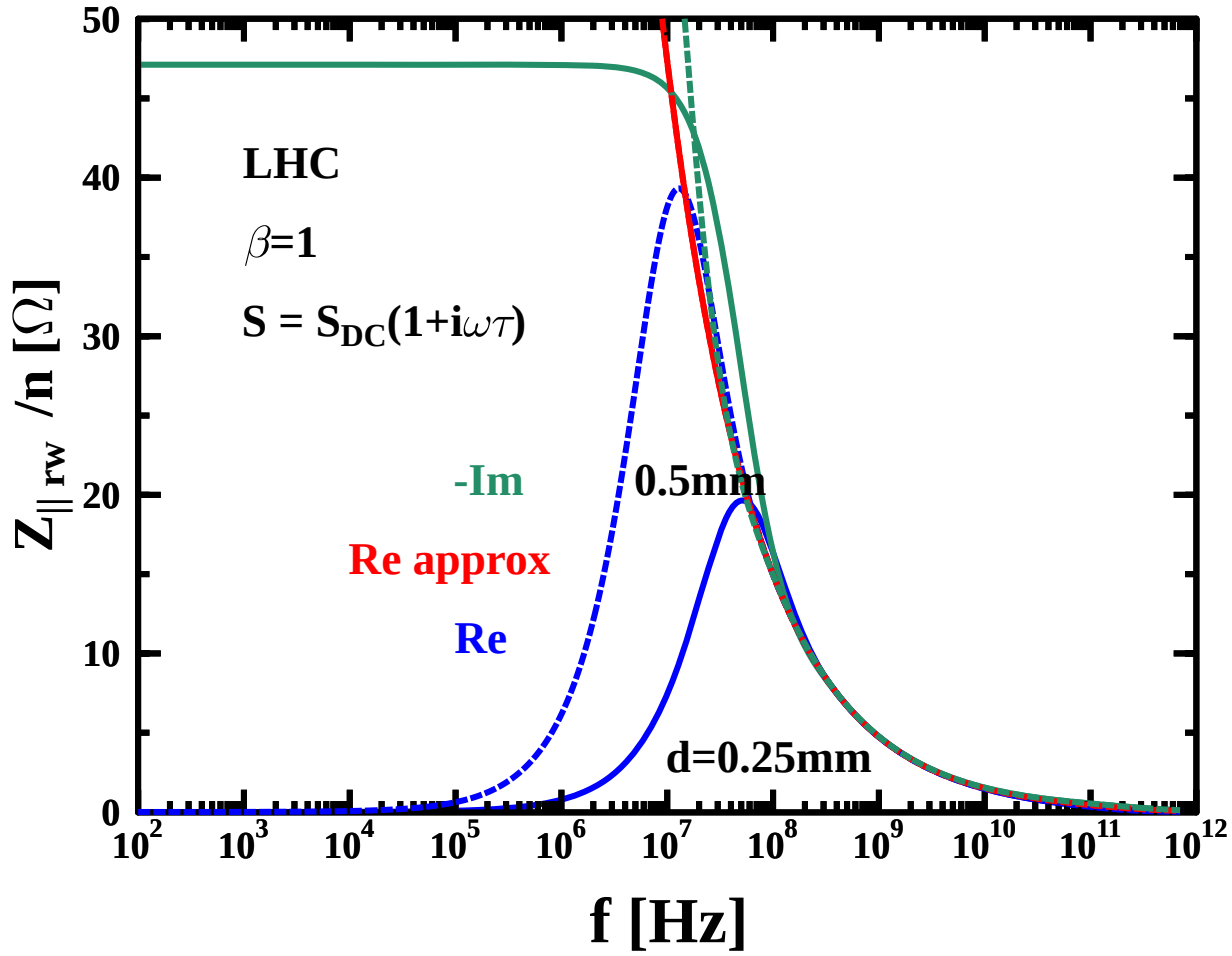


RAINER HASSE (4/6)

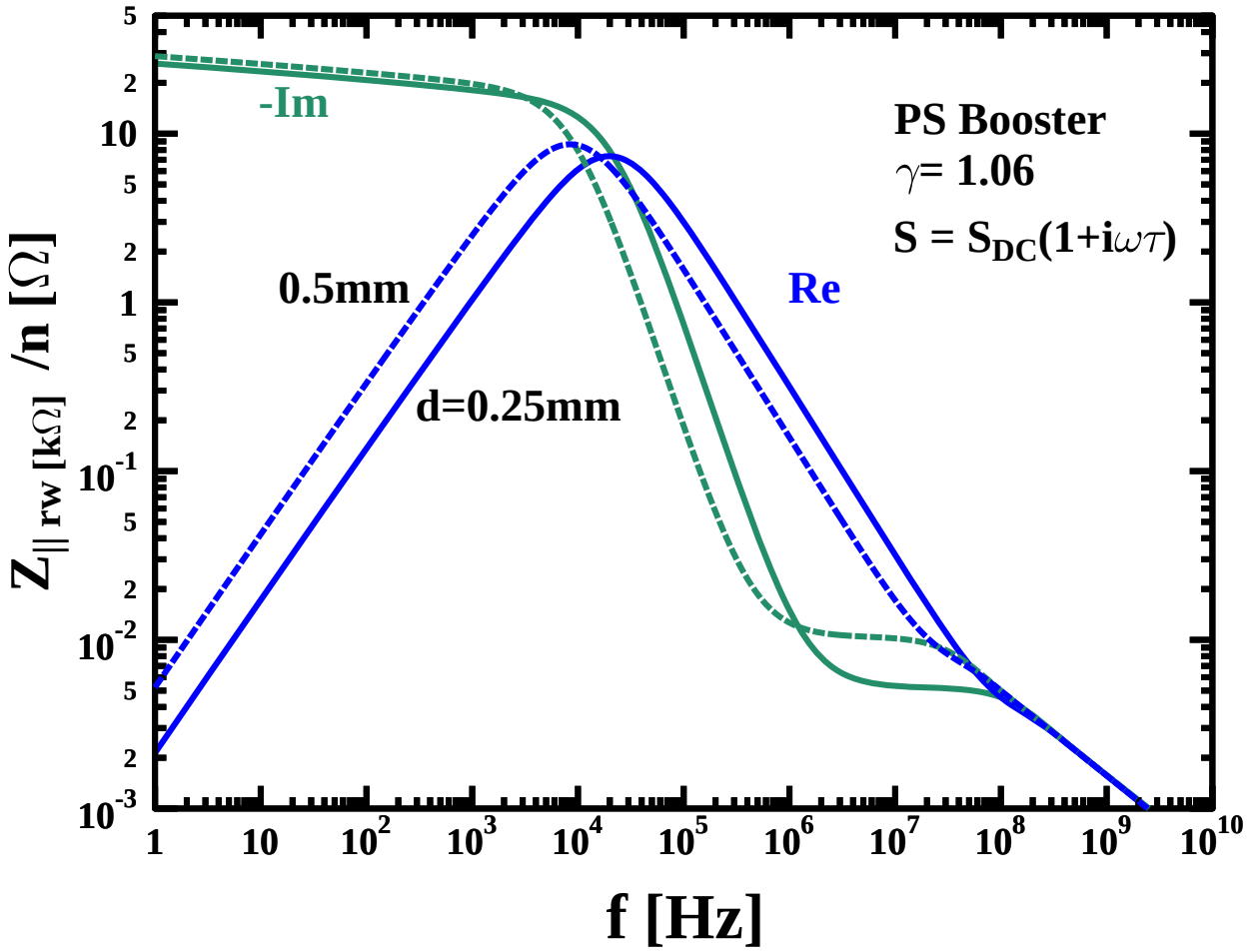
⇒ To be compared with



RAINER HASSE (5/6)



RAINER HASSE (6/6)



APPENDIX: COLLABORATION WITH RAINER HASSE

COLLABORATION BETWEEN CERN (Elias Métral and B. Zotter) AND GSI (Ahmed Al-Khateeb and Rainer Hasse)
Monday, April 10, 2006

As discussed during the workshop in GSI (March 30-31), we proposed to cross-check our formulae and decided to start with the following two items.

1) A LHC collimator

- Circular chamber.
- Longitudinal length = 1 m.
- Make the plots of the real and imaginary parts of the transverse impedance from 0 to 10^13 Hz. Consider an AC conductivity for the graphite $\sigma_{AC} = \sigma_{DC} / (1 + j\, 2\pi\, f\, \tau)$ where σ_{DC} is the DC conductivity (the measured DC isotropic resistivity value is 10 μΩm) and $\tau \approx 0.8$ ps is the relaxation time.
- Make the plot for LHC (with relativistic factors $\beta = 1$ and $\gamma = 7462.69$) and for the PSBooster (with relativistic factors $\beta = 0.3$ and $\gamma = 1.05$).

1.1) Without copper coating

- 1 layer of graphite only extended up to infinity.
- Half gap = 2 mm.
- What is the numerical value of the real and imaginary parts of the transverse impedance at 8 kHz?

1.2) With copper coating

- Add inside a coating of 5 μm of copper (resistivity = 17 nΩm).
- What is the numerical value of the real and imaginary parts of the transverse impedance at 8 kHz?

2) A SPS MKE Kicker

- Circular chamber.
- Longitudinal length = 1.66 m.
- Layer 1 = 4A4 ferrite (8C11 in reality but more complex. See later…).
  - Gap (inner radius) = 16 mm.
  - Thickness = 60 mm.
  - resistivity = ρ = 10^6 Ωm.
  - Permeability:

$$\mu(f) = \frac{\mu_i}{1 + j 2\pi f \tau_\mu} + 1, \qquad \mu_i = 460, \qquad \frac{1}{2\pi\tau_\mu} = 20\,\text{MHz}.$$

  - Permittivity:

$$\varepsilon' = 12 - \frac{j}{2\pi f \rho \varepsilon_0}, \text{ with } \varepsilon_0 = 8.84 * 10\text{^-}12.$$

- Layer 2 = vacuum.
- Make the plots of the real and imaginary parts of the transverse impedance from 0 to 4 GHz.
- What are the numerical values of the real and imaginary parts of the transverse impedance at 1, 2, 3, and 4 GHz?