Resistive Wall Impedance

More General Formulas

Alexander Koschik

6 possible formulas ...

$$Z^{\perp,\,\text{thick}}_{m=1}(\omega) = (\operatorname{sgn}\omega + j)\ \frac{Z_0\ L\ \delta_0\ \mu_r}{2\,\pi\,b^3}\cdot\sqrt{\frac{\omega_0}{|\omega|}}$$

$$Z^{\perp,\,\text{thick}}_{m=1,\,\text{ibp}}(\omega) = (1 + j\ \operatorname{sgn}\omega)\ \frac{Z_0\ L}{2\,\pi\,b^2}\ \frac{1}{-\,j + \operatorname{sgn}\omega\left(1 + b\sqrt{\frac{\sigma_c\ \mu_0}{2\ \mu_r}}\ \sqrt{|\omega|}\right)}$$

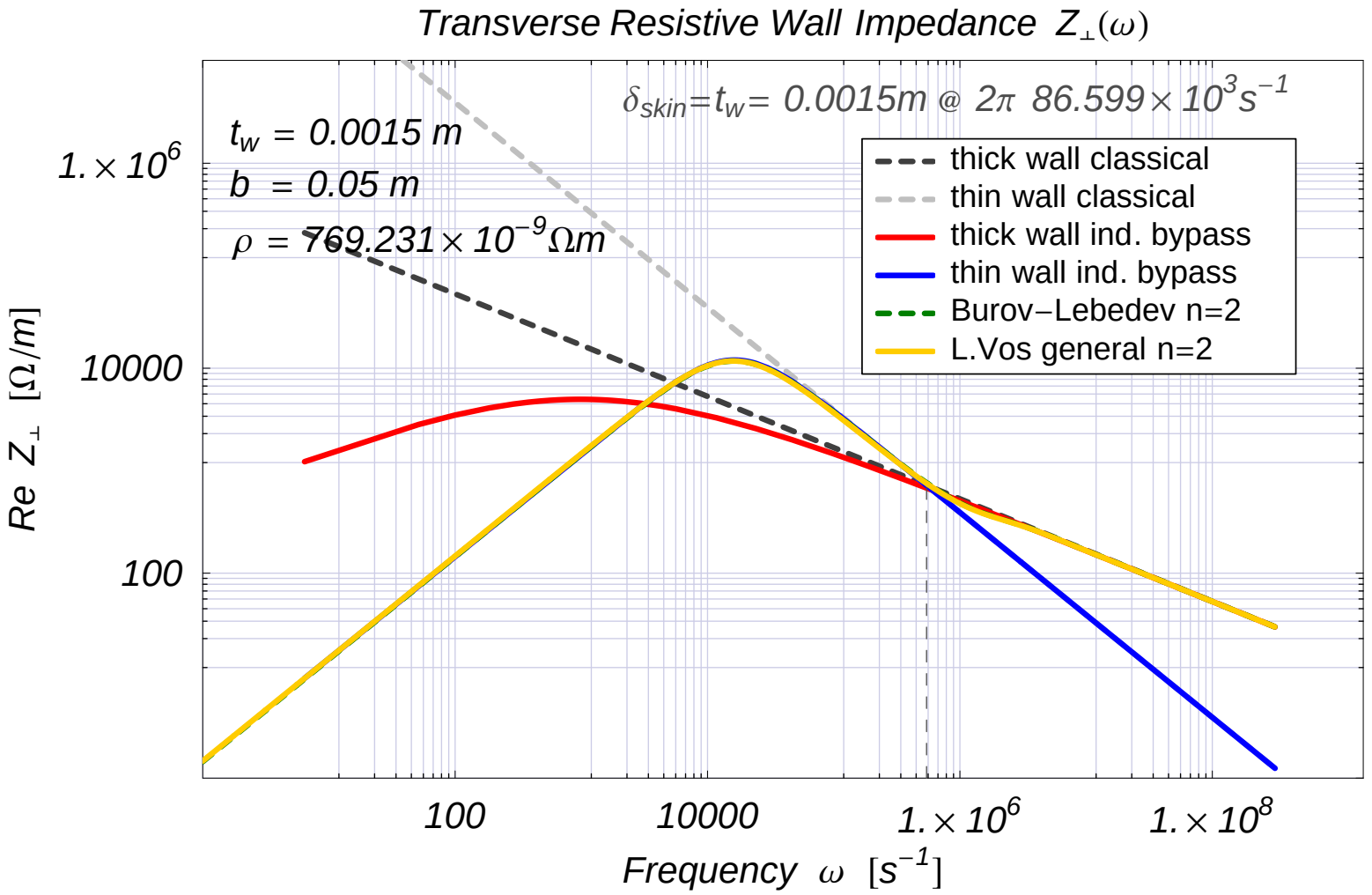
$$Z^{\perp,\,\text{thin}}_{m=1}(\omega) = \frac{c\ L}{\pi\ b^3\ \sigma_c\ t_w\ \cdot\ \omega}$$

$$Z^{\perp,\,\text{thin}}_{m=1,\,\text{ibp}}(\omega) = \frac{Z_0\ L}{2\,\pi\,b^2}\cdot\frac{1}{\frac{1}{2}\,b\,t_w\,\sigma\,\mu_0\cdot\omega - j}$$

$$Z^{\perp,\,\text{LV, n=2}}_{m=1,}(\omega) = \frac{Z_0\ L}{2\,\pi\,b^2}\cdot\left[\frac{b\,\mu_0\,\omega\left(\sqrt{\frac{c^2\ \mu_0^2\ \omega}{\omega - j\ c^2\ \mu_0\ \sigma}} + \sqrt{c^2\ \mu_0^2}\tanh\left(t_w\sqrt{j\ \mu_0\ \sigma\ \omega}\right)\right)}{2\sqrt{c^2\ \mu_0^2}\sqrt{\frac{c^2\ \mu_0^2\ \omega}{\omega - j\ c^2\ \mu_0\ \sigma}} + \frac{2\,c^2\ \mu_0^2\ \omega\ \tanh\left(t_w\sqrt{j\ \mu_0\ \sigma\ \omega}\right)}{\omega - j\ c^2\ \mu_0\ \sigma}} - j\right]^{-1}$$

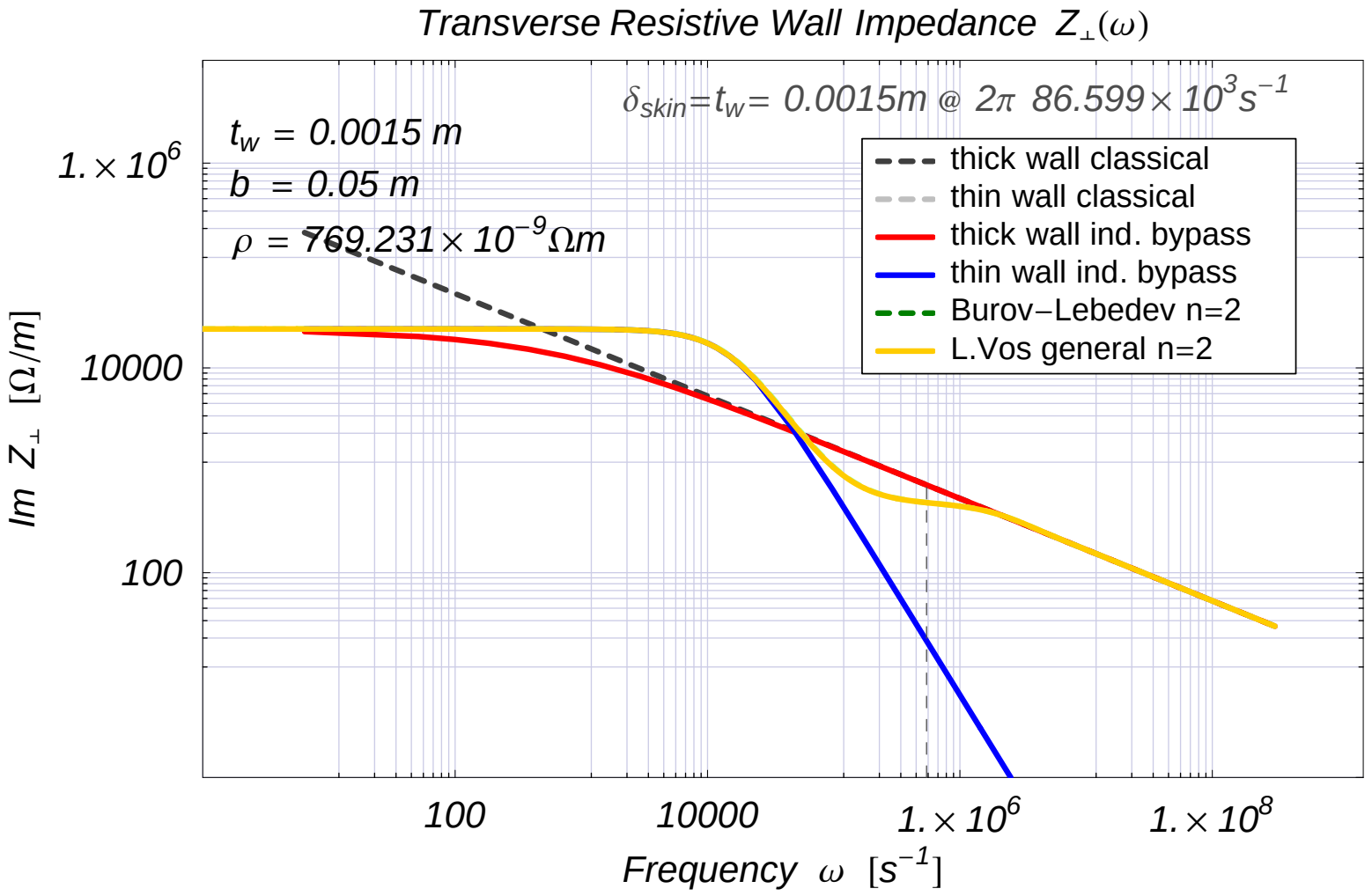
$$Z^{\perp,\,\text{BL}}_{m=1,}(\omega) = \text{algorithm}$$

Bench measurements revisited



"Bench Measurements of Low Frequency Transverse Impedance", CERN-AB-2003-051 (RF)

Bench measurements revisited



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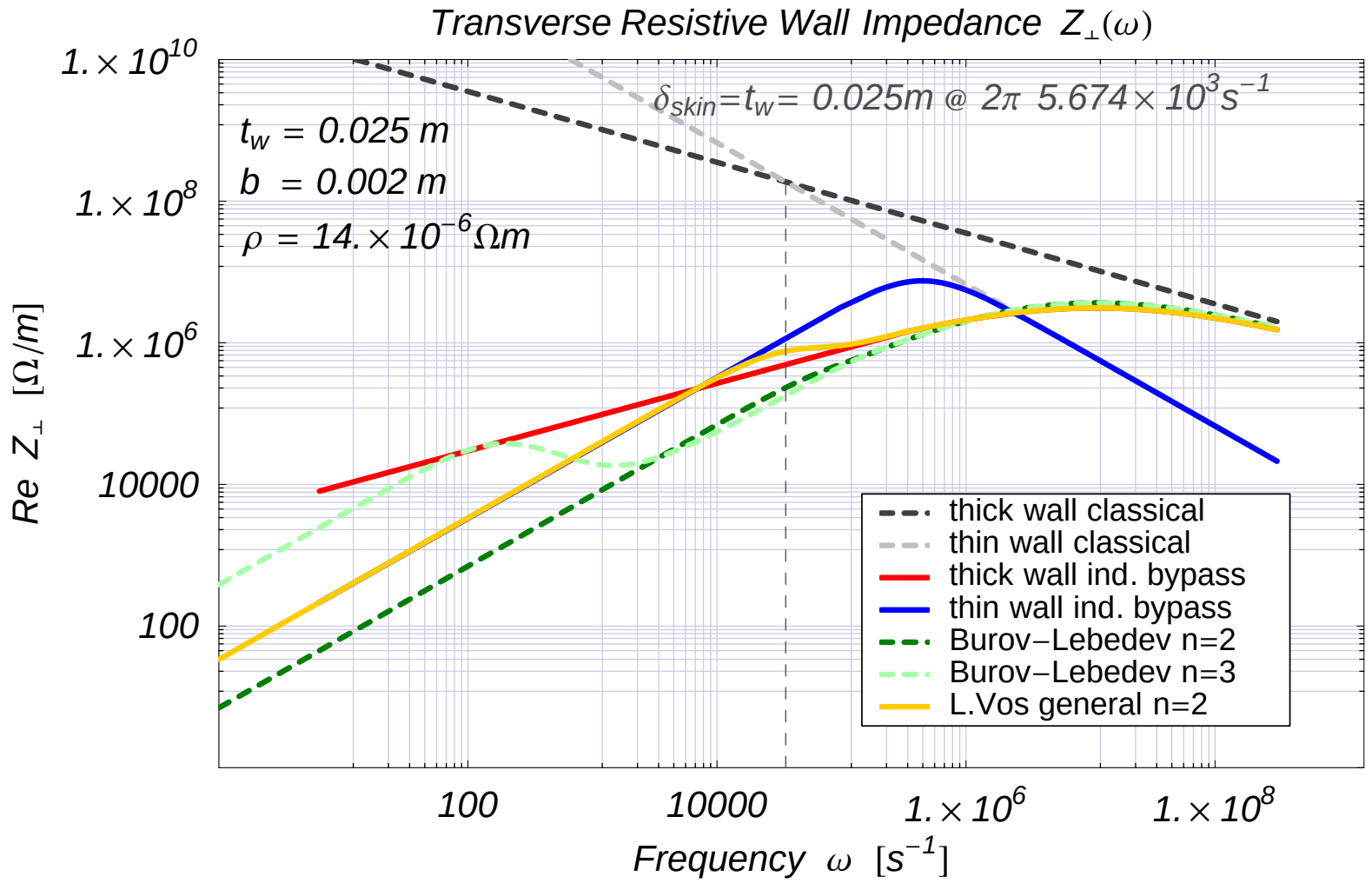
LHC Collimators



LHC Collimators