TCLIA/TCTV transverse impedance simulation

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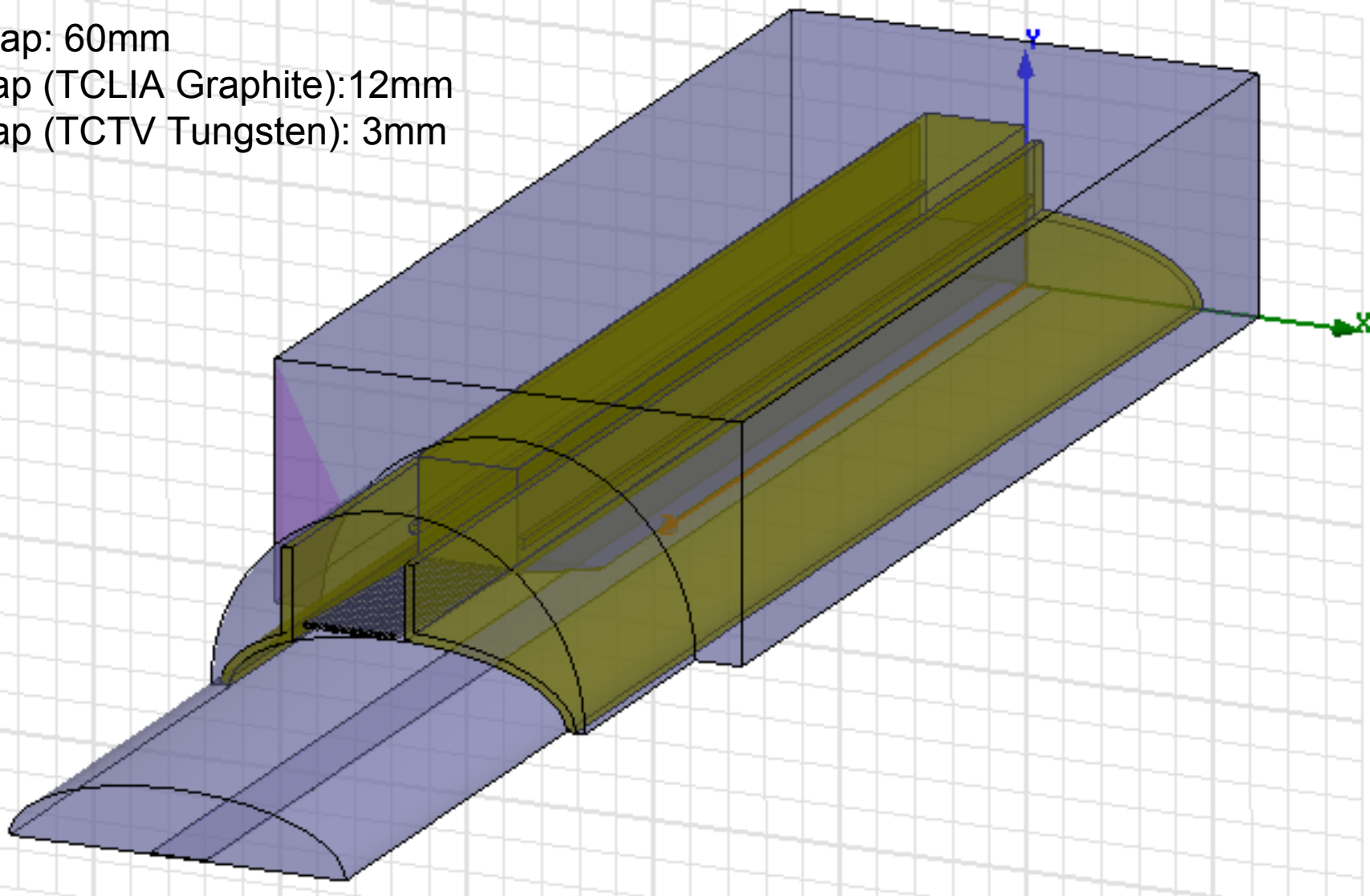
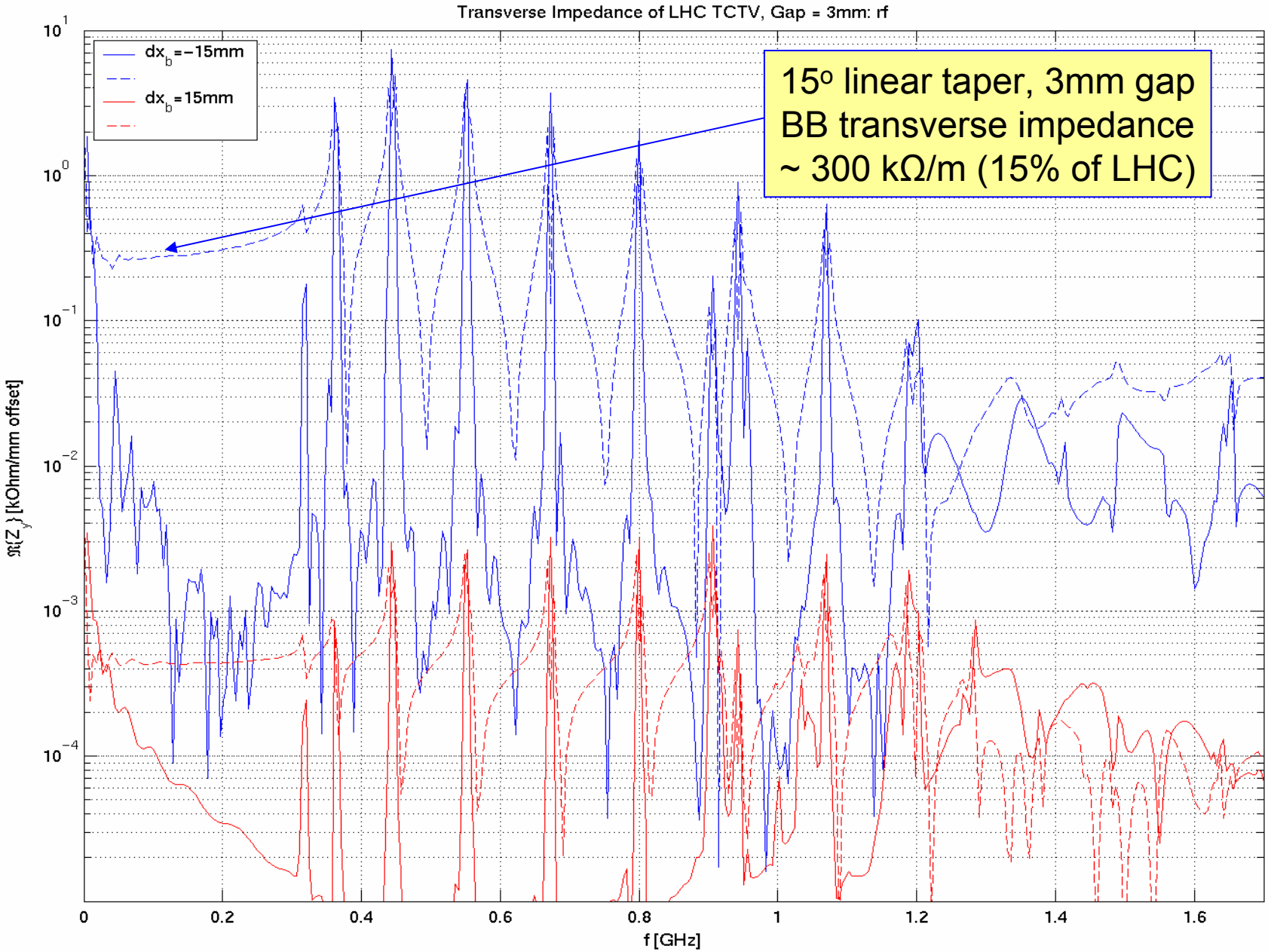
RLC meeting

TCLIA/TCTV geometry

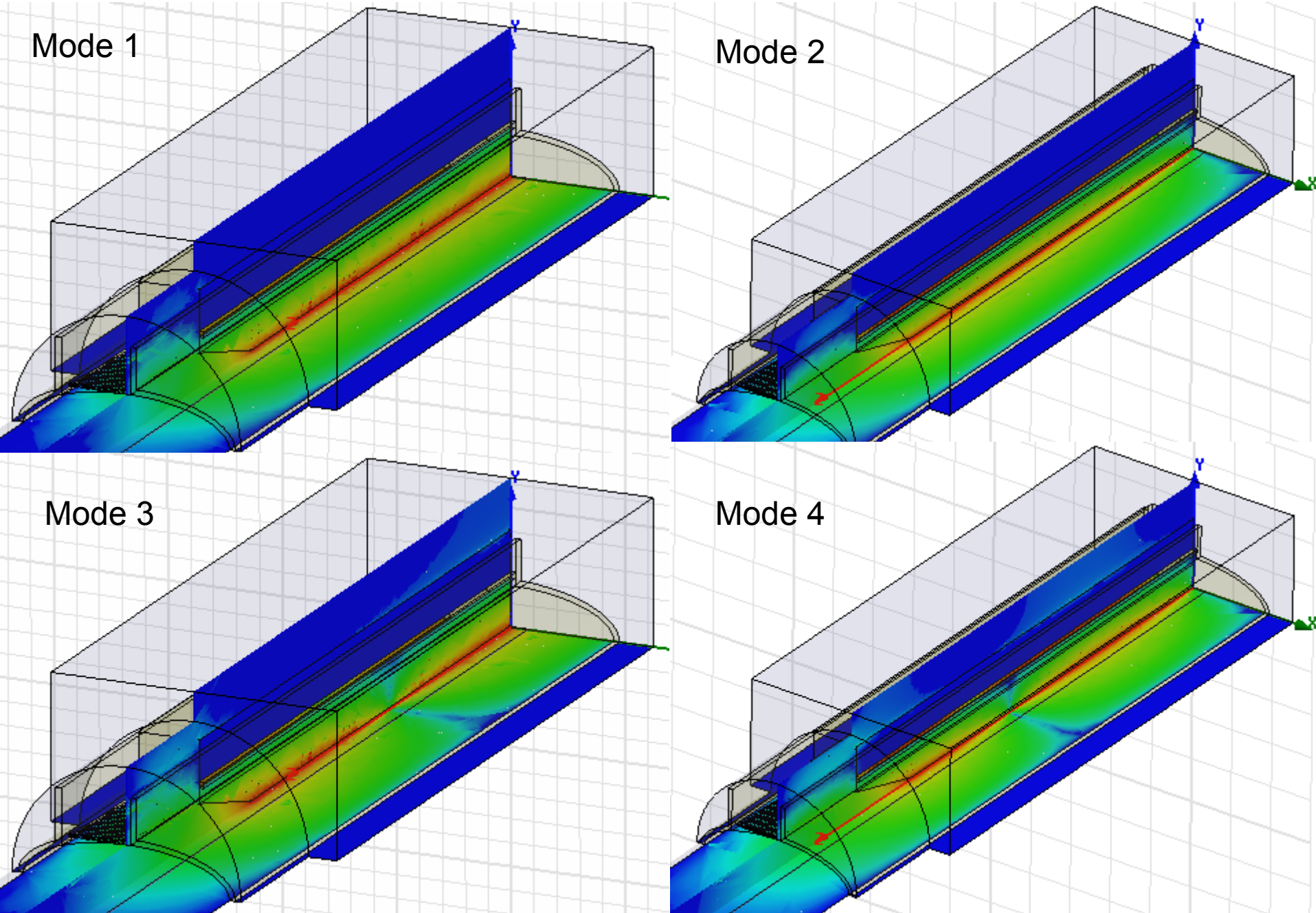
Max gap: 60mm
Min gap (TCLIA Graphite):12mm
Min gap (TCTV Tungsten): 3mm



GdfidL simulation of transverse impedance



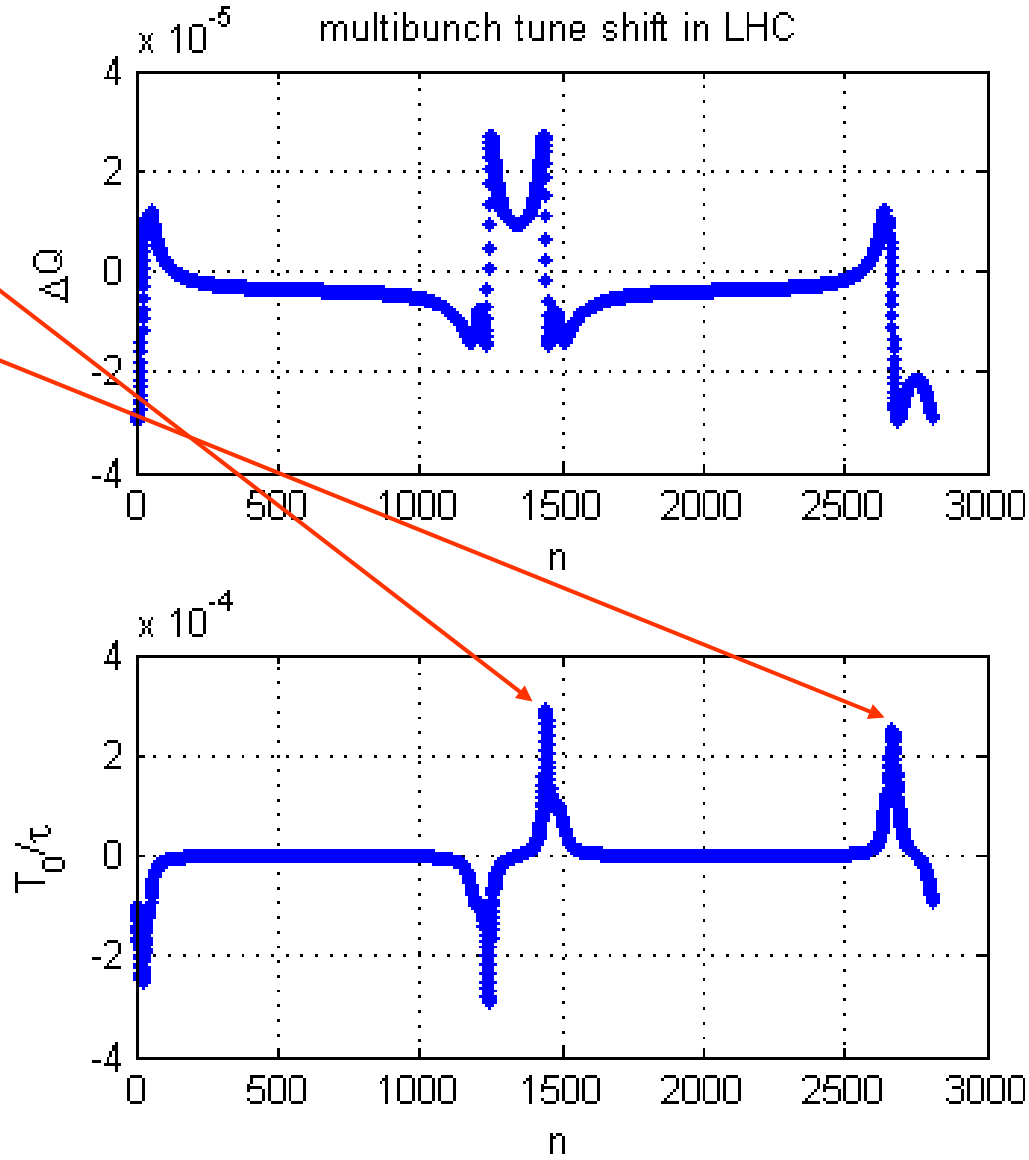
Dipole trapped mode electric field



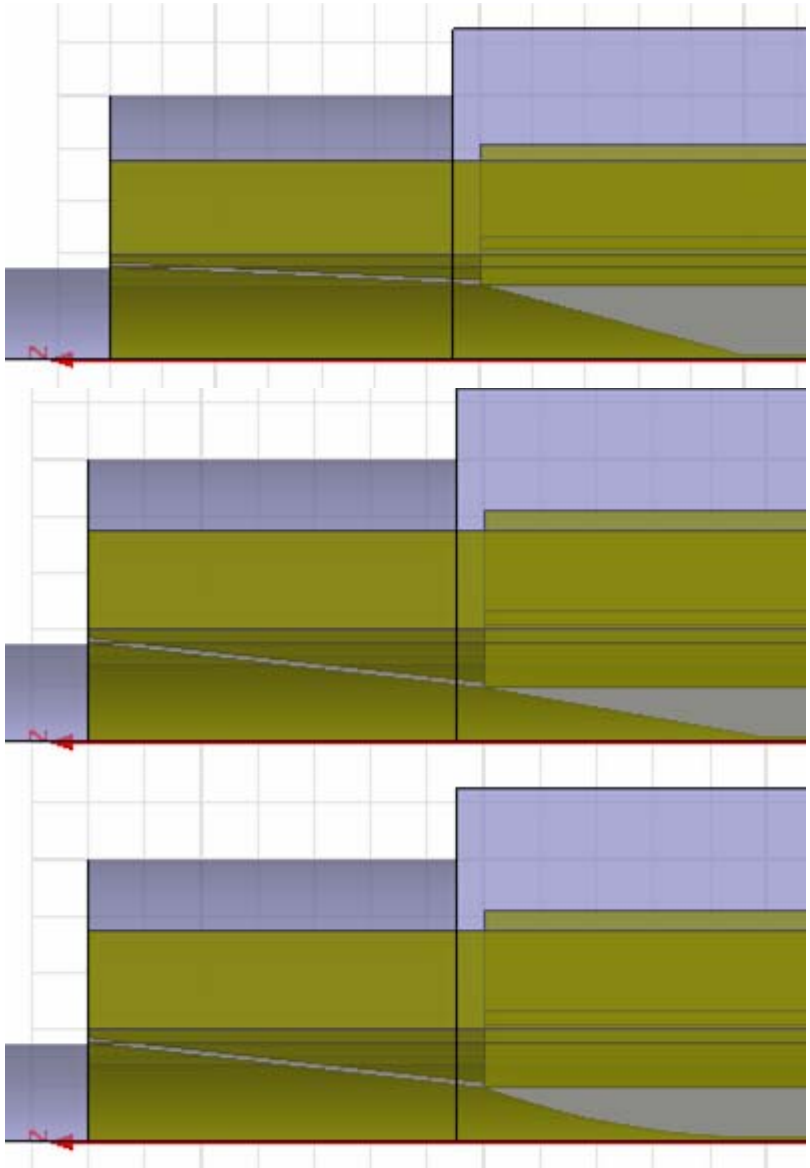
Dipole trapped mode impedance and tune shift

n	f [MHz]	Q	R_t [MΩ/m]
1	317	3080	16.6
2	362	1700	152.8
3	443	1080	173.8
4	551	920	81.4

LHC top energy pars:
E = 7000 GeV
σ_z = 80 mm
N = 10^{11}
f_0 = 11.2455 kHz
Q_y = 59.31



Jaw taper shape optimization



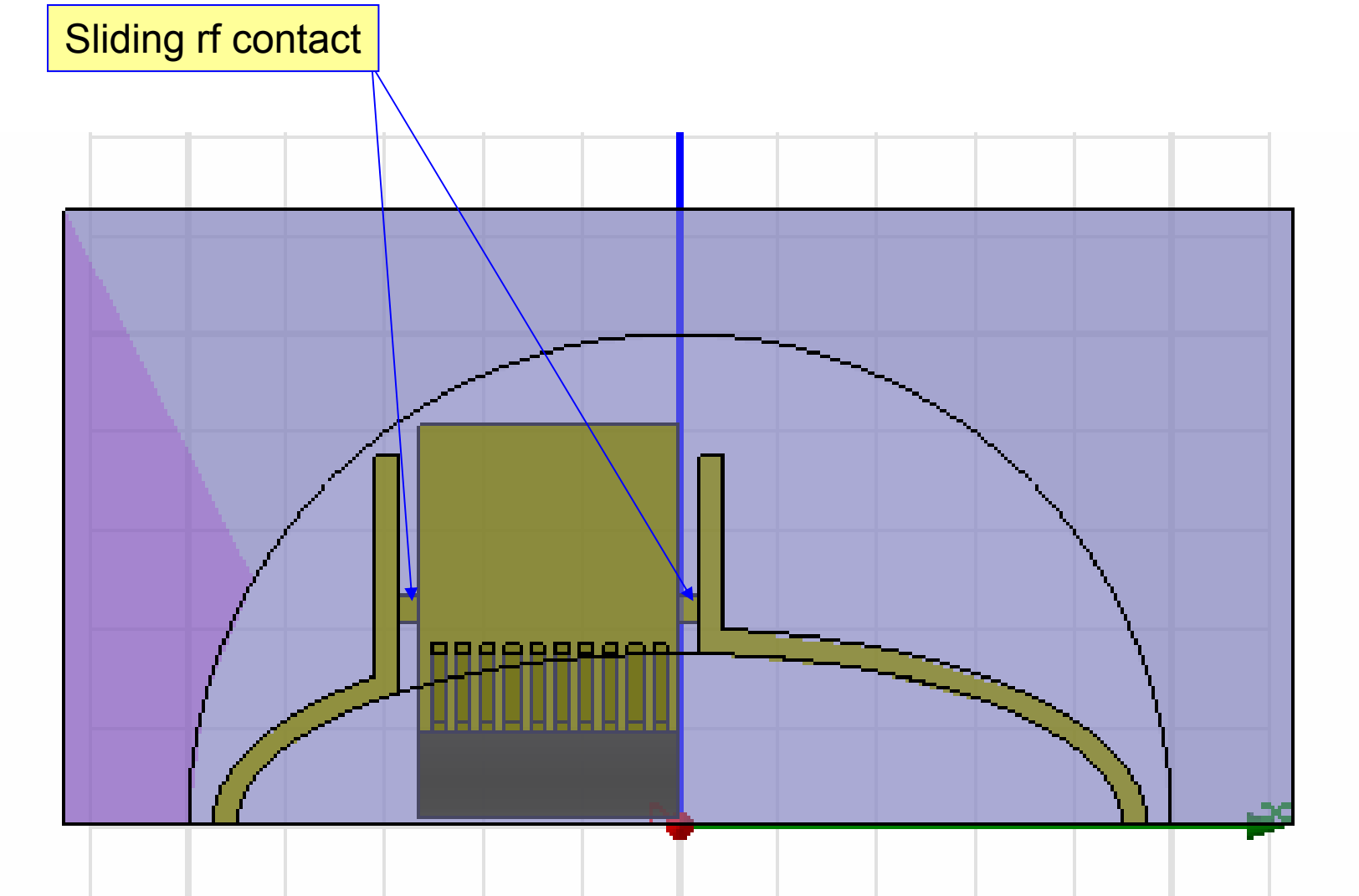
15°- linear taper			
n	f [MHz]	Q	R_t [MΩ/m]
2	362	1700	152.8
3	443	1080	173.8

10°- linear taper			
n	f [MHz]	Q	R_t [MΩ/m]
2	362	1720	132.9
3	443	1100	186.0

10°- non-linear taper			
n	f [MHz]	Q	R_t [MΩ/m]
2	360	1750	98.9
3	437	1120	139.8

It is not a solution for dipole trapped modes

Dipole trapped mode damping with 4S60 ferrite



Conclusions and recomentadions

- Transverse impedance of the present design (both Broad Band and trapped modes) is too high
- Reduction of jaw taper angle from 15 to 10(7) degree and/or making non-linear taper is not a solution for the trapped modes. But, probably, it can reduce the BB impedance
- A possible solution for reduction of impedance of the dipole trapped modes by means of damping could be opening the longitudinal slots.
- The drawback will be excitation of low frequency trapped modes both monopole and dipole which on the other hand can be damped efficiently. (to be demonstrated)